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RETIREMENT OF MR. GREEN,
CEYLON GOVERNMENT ENTOMOLOGIST.

After a period of 14 years' service Mr. E. E. Green has for purely family reasons resigned his appointment as Government Entomologist. His loss will be severely felt by the Department of Agriculture to whose councils he brought ripe experience in all matters connected with Ceylon planting besides that of his own special subject, by the Society and by the Island generally.

Mr. Green came to Ceylon in 1881 and began as a planting student in the Dickoya district.

From his earliest boyood he had always been interested in natural history and had made systematic collections of Lepidoptera in England. His interest in Entomology continued in Ceylon. As a planter, first of coffee and cinchona and later of tea, his attention was early attracted to the study of the insect pests of these plants. In 1883 he took up the management of an estate in Pundaluoya and remained on the same estate for sixteen years.

About the year 1885, coffee, already weakened by leaf-disease, fell a prey to a serious insect pest that had not previously been observed. It proved to be a new species of "scale-bug" which was subsequently described by Mr. Green under the name of *Lecanium viride*. So serious were the ravages of this insect that he was asked by the Ceylon Government to investigate and report. His report, with a coloured plate, was published as a Government Blue Book. Unfortunately the pest had then established itself too firmly and widely to be controlled and coffee was finally doomed, to give place to tea. Evidence goes to show that this pest was almost certainly introduced from Africa with liberian coffee plants and this occurrence turned his attention to the importance of establishing quarantine for all imported plants.

In 1888 he published a series of articles on Insect Pests of the Tea plant in *The Independent*, then edited by Geo. Wall.

Proofs of the first edition of Dr. (now Sir George) Watt's "Pests and Blights of the Tea Plant" were submitted to him for observations and corrections.

In 1893 Mr. Green began the special study of the Coccidæ and determined to monograph the Coccidæ of Ceylon. This work, of which 4 volumes have already been issued, has grown to unexpected dimensions. It is published at his private expense and has proved a costly hobby. The several volumes have been published during his periods of leave in England and has led to a large increase of outside work. There are few specialists in this group; consequently Mr. Green was soon recognised as an authority and inundated with material from many parts of the world.

He was appointed honorary Government Entomologist in 1897 and undertook several investigations of important diseases. In the early days of Cacao canker, the planters believed the disease to be due to an insect. Mr. Green refuted this idea giving it as his opinion (in conjunction with Dr. J. C. Willis) that the disease was of fungal origin. He also investigated and reported upon insects destructive to stored paddy, and upon an outbreak of locusts. In 1899 he was appointed official Government Entomologist with residence at Peradeniya.

In 1901 he was awarded the recently established Barclay medal by the Royal Asiatic Society of Bengal for biological work connected with India during the previous ten years. This was the first award.

Mr. Green's experience as a practical planter gave him a useful insight into what methods of treatment were or were not practicable. He has always endeavoured to allay scares; to avoid the recommendation of impracticable and expensive treatments.

Early in his official career he insisted upon the importance of a Quarantine station in Colombo, was responsible for the establishment of such a station and for the compulsory treatment of all imported plants.

Beside the larger work on Coccidæ he has published over 200 papers and articles on economic and general entomology, in various Journals and Transactions. Mr. Green was the first holder of the post of Government Entomologist in Ceylon; if not the first official Economic Entomologist in the tropics.

We give a portrait of Mr. Green working in his laboratory at Peradeniya.

COTTON EXPERIMENTS IN THE CAPE PROVINCE.

The following extracts are on the above subject from a paper contributed by A. van Ryneveld, Research Branch, Grootfontein School of Agriculture, to the *Agricultural Journal of the Union of South Africa.*

Site.

The site chosen for the experiment was at the Big Umgazi, in the District of Port St. Johns, Pondoland, on ground belonging to Messrs. Wardlaw and Kirsten. The soil consists of a rich, dark, heavy, sandy loam—in fact might be termed a chocolate loam—and was moderately moist at planting time.

Planting.

Ten pounds weight of seed was used per acre and planted with a single "Cole Cotton Planter." Owing to a protracted period of drought and the consequent hardness of the ground, and above all a virulent outbreak of East Coast fever in the district, resulting in scarcity of oxen for ploughing, the land was only ploughed up once, namely, just before planting. The soil, however, was well turned over and harrowed until the big clods were broken up and fairly fine tilth obtained. Weather conditions were favourable during planting time, a shower of rain (about ·35) having fallen the evening after planting was completed, most of the seed germinating in five to six days, resulting in a good, healthy and full stand for all the varieties with the exception of the Nyasaland Upland which, as will be seen from the table, only realized a 52 per cent. stand. Plants were thinned out to requisite distance when fourteen days old and again at one month. The perennial varieties—that is the Sea Island and Egyptian—were planted from 5 feet to 6 feet apart in the rows, a few rows being 7 feet for experimental purposes. The rows of the rest were 4 feet apart,

The following table shows the results obtained :—

TABLE OF RESULTS.

Date of Planting.	Locality.	Variety Planted.	Weight of plant in inches.		No. of Bolls to plant.		No. of Bolls to 1 lb. of Seed Cotton.		Percentage of Sand.	Size of Plot in Acres.	Yield per Plot.	Yield per Acre.
			Selected	Average	Selected	As found	Selected	As found				
1911.									%		lb.	lb.
Oct. 28	Big Umgazi.	Sea Island.	102	78	188	150	89	112	99	5	6,849	1,369·8
,, 29	Port St. John, Pondoland.	Egyptian Mitafifi.	102	78	222	99	98	119	94	3	3,857	1,285·6
,, ,,	,,	American Toole.	60	51	130	71	66	75	80	2	4,135	2,067·5
,, 30	,,	Nyasaland Upland.	72	60	168	97	68	73	52	3½	5,419	1,548·2
,, ,,	,,	Cleveland. Big Boll.	54	48	59	39	43	52	100	⅓	505	1,010·0
,, ,,	,,	Herlong	48	45	57	34	—	—	100	⅓	90	810·0

COST OF PRODUCTION AND ESTIMATED PROFIT PER ACRE.

The following is the cost of production and estimated profit per acre of the different varieties planted :—

Sea Island.

Preparing and ploughing	...	...	£0 10 0
Harrowing	...	...	0 1 0
Planting	...	...	0 1 0
Seed	...	...	0 1 0
Chopping (thinning out)	...	...	0 2 0
Cultivating and hand-hoeing		...	0 12 0
Picking	...	...	1 16 0
Transport	...	...	0 4 0
Wear and tear of implements		...	0 1 0
Sundries	...	...	0 2 0
			£3 10 0
1,369 lb. seed cotton at 3*d.* per lb.		...	£17 2 3
Less cost of production	...	...	3 10 0
Estimated profit per acre		...	£13 12 3

Mitafifi.

			£. s. d.
1,285 lb. seed cotton at 3d. per lb.	...	...	16 1 3
Less cost of production	...	...	3 0 0
Estimated profit per acre	...	...	13 1 3

American Toole.

2,067 lb. seed cotton at 3d. per lb.	...	...	25 16 9
Less cost of production	...	...	3 10 0
Estimated profit per acre	...	...	22 6 9

Nayasaland Upland.

1,548 lb. seek cotton at 3*d.* per lb.	...	...	19 12 0
Less cost of production	...	...	3 0 0
Estimated profit per acre	...	...	16 12 0

Cleveland Big Boll.

1, 010 lb. seed cotton at 3*d.* per lb.	...	...	12 12 6
Less cost of production	...	...	2 15 0
Estimated profit per acre	...	...	9 17 6

Herlong.

810 lb. seed cotton at 3*d.* per lb.	...	...	10 2 6
Less cost of production	...	...	2 15 0
Estimated profit per acre	...	...	7 7 6

IRRIGATION OF CEARA RUBBER.

About a year ago we called attention to the advantages that the Kibwezi rubber estate derived from irrigating the trees (Ceara). Today out of the 562 acres planted, some 345 acres have been so treated, and advices go to show that the trees have much improved where irrigated. —*Tropical Life.*

A GREEN MANURE FOR TOBACCO.

Thespesia Populnea, Tulip tree.

Suriya, Sinhalese; *Puvarasu*, Tamil.

The tulip grows freely near the sea and in the dry zone including Trincomalee, Batticaloa, Kalpitiya, Jaffna and Mannar, and was planted by the Dutch as a roadside tree. It produces yellow tulip-like flowers more or less throughout the year.

It is now largely used as a green manure for tobacco by the Jaffna cultivators, and in December cartloads of the leaves and branches were being cut and carried to the tobacco fields, where the material was dug or ploughed in fresh.

An average sample of the leaves and branches was taken for analysis and shewed a ratio of two to three leaves and buds to one of wood.

On sun drying the leaves lost 66·3 % of moisture and the wood 71·4 %, but the leaves had partly withered on reaching the laboratory.

The composition of the sun-dried samples was

Moisture	18·5 %
Organic matter	71·2 ,,
Ash	10·3 ,,
	100·0

The organic matter contained 2·2 % of Nitrogen calculated on the sun-dried sample or approximately 0·64 % on the fresh twigs, equivalent to 14⅓ lbs. per ton.

The composition of the Ash shows that it is rich in lime and potash, the latter constituent being largely required for successful tobacco growing.

For comparison the amount of Nitrogen and the Ash analysis is compared with other plants, which might be usefully employed for the same purpose :—

	Percentage of Ash in Sundried Plants.	Lime.	Potash.	Phosphoric Acid.	Nitrogen.
Thespesia populnea ...	10·30 %	26·00 %	26·8 %	5·40 %	2·20 %
Vigna Catiang ...	14·16 ,,	24·00 ,,	24·5 ,,	5·86 ,,	3·88 ,,
Crotalaria striata ...	6·62 ,,	15·85 ,,	35·5 ,,	11·82 ,,	3·80 ,,
Phaseolus lunatus ...	7·70 ,,	22·30 ,,	35·1 ,,	9·35 ,,	2·98 ,,
Leucæna glauca ...	5·52 ,,	32·90 ,,	24·9 ,,	5·60 ,,	2·57 ,,
Tephrosia Purpurea...	4·89 ,,	30·00 ,,	24·1 ,,	11·42 ,,	2.39 ,,
Tephrosia candida ...	5·16 ,,	20·00 ,,	31·5 ,,	7·19 ,,	2·80 ,,

While *Crotalaria striata*, *Phaseolus lunatus*, and *Tephrosia candida* have a larger percentage of potash in the Ash, the percentage of ash is lower, so that a ton of these plants would have approximately the same value as regards potash. As regards Nitrogen, *Vigna Catiang*, *Crotalaria striata* and *Phaseolus lunatus* are more valuable than any of the others; and their growth in waste lands is to be recommended.

M. KELWAY BAMBER,
Government Chemist.

A LAND BANK FOR SOUTH AFRICA.

The following article is extracted from *The Agricultural Journal of the Union of South Africa* for the month of December 1912:—

Another landmark in the agricultural progress of South Africa is the establishment of the Land Bank. This bank has been provided for the purpose of aiding deserving agriculturists in the development of their farms. With the advent of Union the Provincial Agricultural Banks were amalgamated into one union Bank with head-quarters in Pretoria. As this combined bank has been modelled on the lines of the Transvaal Land Bank it may be of interest to recall the nature and scope of the operations of the latter. The Transvaal Land Bank was started in 1907, and carried on business for four and a half years. During this period, moneys were advanced to the amount of £2,105,000 the security being farm property worth nearly £7,000,000. The average loan was £357, a figure which clearly shows that the directors kept in view the main object for which the bank was established, namely, to help the small farmer. No loan exceeded £2,500. The total number of loans issued was 5,661, which is approximately one-quarter of the rural population of the Transvaal, and indicates how widely the bank was appreciated. The Transvaal Land Bank not only enabled farmers to pay off mortgages by advancing money at reasonable rates, but it also brought down the general rate of interest on farm property. The bank proved that, in the past, many agriculturists had been paying too much for advances. The bank relieved them, and at the same time, set free a large sum for beneficial development of the land instead of permitting it to swell the profits of Shylockian money lenders.

The Capital.

The capital of the New Union Bank is fixed at £6,000,000 and consists of the capital of the old Provincial Banks, together with such further moneys as Parliament may authorize. Its operations are controlled by a Central Board in Pretoria, assisted by four local Advisory Boards in other parts of the Union. Under the Union Land Bank the loans will vary from £50 to £2,000. The method of procedure is as follows: Any farmer who desires a loan goes to the nearest magistrate and fills in a form of application. He pays two fees; one on the amount of the loan, varying from £1 to £1 10*s*., and the other a valuator's fee of £1. The valuator then submits his valuation to the magistrate who forwards the application with his recommendation to the Local Board, who in turn, forward it to the Central Board. The Local Board is purely advisory. The Central Board finally determines whether the application shall be approved. The interest for the first five years is at 5 per cent.; thereafter capital and interest for twenty-five years at 7 per cent. These loans are for a period of thirty years. There is another form of loan called the cash credit loan limited to £1,000 at 6 per cent. This loan is granted on a reasonable security, and is intended specially to encourage the purchase of live stock and any nec saries connected with farming operations,

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HIS EXCELLENCY THE HON'BLE MR. R. E. STUBBS,

Officer Administering the Government, Ceylon.

THE BOARD OF AGRICULTURE.

QUARTERLY MEETING.

The Quarterly Meeting of the Ceylon Board of Agriculture was held in the Council Chamber at noon on February 3rd, 1913.

The HON'BLE MR. REGINALD STUBBS.

The Board had the priviledge of meeting for the first time His Excellency the Officer Administering the Government, the Hon'ble Mr. Reginald Stubbs, newly appointed Colonial Secretary of Ceylon, who presided at the meeting.

There were also present:—The Hon'ble the Colonial Secretary, the Hon'ble the Colonial Treasurer, the Hon. Mr. P. Arunachalam, the Hon. Mr. A. S. Pagden, the Hon. Mr. A. J. R. de Soysa, the Hon. Mr. Hector VanCuylenburg, the Hon. Mr. Alexander Fairlie, the Director of Agriculture, Dunuwile Dissawa, Dr. H. M. Fernando, Dr. J. Pearson, Mudaliyar Tudor Rajapakse, Mudaliyar A. E. Rajapakse, R. E. Paranagama, R. M., Messrs. M. Kelway Bamber, D. S. Corlett, Francis Beven, A. W. Beven, Francis Daniel, J. Harbord, J. D. Vander Straaten, James Peiris, A. N. Galbraith, Rev. Fr. Paul Cocreman and the Secretary (Mr. C. Drieberg). The following members of the Society were also present:—Messrs. C. B. Brodie, John H. Pereira, Montague E. Cooke and some visitors.

The Minutes of the last meeting held on September 10th, 1912, were duly read and confirmed.

Progress Report No. 61 was adopted, on the motion of Mr. A. W. Beven and seconded by Mr. A. E. Rajapakse.

Statements of expenditure for September, October, November and December, 1912, were tabled, and adopted.

The Director of Agriculture said that in view of the formation of the new Department of Agriculture members may have exercised their minds speculating as to what the future work would be. At the last meeting of the Agricultural Experiments Committee held early in January at Peradeniya the future of that Committee was discussed and it was thought likely that it would resolve itself eventually into several sub-Committees managing the various experiment stations. On these sub-Committees several members of the Board would be asked to serve. The Board of Agriculture is scarcely representative of the whole Agriculture of the Island nor is the Experiments Committee. And it seemed to him a uniting of these two bodies was not unlikely to come about forming one comprehensive Board of Agriculture representative of all interests, with working Sub-Committees. Among these Sub-Committees would be one responsible for the management of the Society. The suggestion would involve a reduction in the number of members of the Board.

Mr. Lyne went on to touch on the establishment of a College of Tropical Agriculture, a question that has been before the tropical world for the past two years. Though Ceylon was mentioned as the best site, no response has gone from Ceylon. He advised that the voice of Ceylon

should be heard, and it is for the Board to take up the matter. The subject was ripe for discussion.

The Hon. Mr. Arunachalam enquired whether there was a motion before the meeting, and was informed from the chair that there was not.

Mr. James Peiris who was heartily in support of the opinion expressed by Mr. Lyne, enquired what steps he proposed to take to further the the object in view.

The Director advised the formation of a Committee as first step, with a view to approach the Planters' Association, Lowcountry Products Association and arouse public opinion.

Mr. Peiris proposed the following Committee :—

The Hon. Mr. P. Arunachalam, Dr. H. M. Fernando, the Director of Public Instruction, the Director of Agriculture, Messrs. Francis Beven, M. Kelway Bamber, James Peiris, and C. Drieberg (Secretary) with power to add to their number.

Dr. Fernando seconded the motion, which was unanimously carried after a few remarks by Dr. Pearson, the Director, H.E. the President and Mr. Peiris.

The question of holding Society meetings on the same day as the Board meetings but at a later hour (6-30 p. m.) was brought up as a motion by the Director. Dr. Pearson seconded the motion; but after some remarks offered by Messrs. Booth, Beven and Dunuwile, the motion was lost as also an amendment by Mr. Van Cuylenburg that the hour might be 3 p.m. instead of 6-30.

The Director mentioned the subject of the proposed acquisition of the "Tropical Agriculturist" by the Society. The Hon. Mr. Arunachalam proposed a Vote of Thanks to Sir Henry McCallum for the services he has rendered to the Agriculture of the Colony in general and the Ceylon Agricultural Society in particular. This was seconded by Dunuwile Dissawa and supported by Mr. Francis Beven and the resolution was unanimously adopted.

Society's Meeting.

At the Society's meeting which folllowed at 1 p.m., the Director of Agriculture presiding, the subjects that came up for discussion were :—

"The Possibilities of Cultivation in the Dry Zone" by Dr. H. M. Fernando. Mr. A. W. Beven, Rev. Father Cooreman, Mr. Bamber, the Director and Mudaliyar A. E. Rajapakse joined in the discussion that followed.

The Director outlined the scope of the proposed Coconut Trial Grounds, indicating where it was thought desirable to establish experimental stations, which must in every case be near a railway station.

A paper entitled "Working of a Co-operative Credit Society" by Mr. C. Rasanayagam, previously circulated, was taken as read. The Director commented on the paper and dwelt on Co-operative work pursued in other parts of the world, giving details of successful work done in India and referring to the late visit of Sir Rider Haggard, an eminent authority on Agricultural co-operation.

CEYLON AGRICULTURAL SOCIETY

PROGRESS REPORT LXI.

MEMBERSHIP.

Since the meeting held on September 10 last the following members have joined the Society :—Paul E. Pieris ; the Superintendents of Vogan Estate, Stamford Hill, Penrhos Estate, Kanapedewattie, Honiton Estate, Rilhena Estate ; Advocate C. A. LaBrooy, Edith C. Sortain, D. Speldewinde, A. P. Fernando, Dr. J. H. P. Wijesinha, Otley B. Crozier, Frank Modder, A. W. Prautch, Bertram Hill, John H. Pereira.

STAFF, INSPECTION WORKS, &C.

The Director of Agriculture and the Secretary made an extended tour during the second half of September, visiting Tissamaharama, Hambantota, Ambalantota, Tangalla, Deniyaya, Matara, Galle, Nagoda, Baddegama, Ambalangoda, Elpitiya, Bentota, Kalutara, attending meetings at different centres, where they were met by representatives of the Branch Agricultural Societies, conferring with the Revenue Officers, and inspecting school gardens and plantations *en route*. They subsequently visited Hettipola and Chilaw.

The Secretary, whose office was transferred to Peradeniya on October 1, also visited Vavuniya, Talatu-oya, Murutalawa, Kobbekaduwa, Nugawela, Teldeniya, Urugala, Madugoda, Bilihuloya, Haldummulla, Palugama, Welimada, Dikwella, Badulla and Passara.

Mr. S Chelliah, Agricultural Instructor of the Northern Province, was engaged in planting cotton at Puneryn, Nallur, &c., as well as in directing the planting of Ceara rubber under the Vavuniya tank.

Mr. N. Wickremaratne who was stationed at Galle was transferred to Peradeniya (with supervision of the Kegalla division) in October, Mr. Jayasuriya from Kegalla succeeding him at Galle. Mr. Wickremaratne was on two occasions sent to Vavuniya to assist Mr. Chelliah, and was otherwise occupied in the Peradeniya office.

Mr. L. A. D. Silva has been working in the Ratnapura District, and gave special attention to the Balangoda experimental garden.

Mr. W. Molegode, Agricultural Instructor, Central Province, was engaged in supervising the cultivation of a paddy field in Matale, the planting of cotton in Tumpane and Dunuwila, and the laying out of a school garden at Nugawela on new lines.

Mr. N. M Jayasuriya rendered assistance in organizing a Co-operative Credit Society for the Galboda and Kinigoda korales. Since his transfer to Galle he has been kept very busy in connection with cotton planting, chiefly at Ambalantota.

Mr. A. Madanayake, Agricultural Instructor, North-Western Province, was engaged in supervising the gardens at Balalla and Hettipola, besides touring in his district.

Mr. C. K. Sathasivam, Agricultural Instructor, Eastern Province, was chiefly occupied with the experimental garden at Tampiluvil, travelling at intervals. He was on sick leave from August 20 till September 7.

Mr. P. B. M. Bandaranayake, Agricultural Instructor, Province of Uva, helped to plant cotton at various centres, besides supervising experimental plots of paddy planted with a view to settle certain questions in connection with transplanting and manuring.

Mr. M. J. A. Karunanayake, Agricultural Instructor, Western Province, who was attached to the seed store, was deputed to co-operate with the Chilaw-Puttalam Show Committee. He was occupied on this duty for nearly three months, and helped to make the show the success it was.

SHOWS.

The Chilaw-Puttalam Show was held on December 12 and 13 last. It was well planned by the Assistant Government Agent (Mr. Conroy), who was ably assisted by Mr. Corea, Mudaliyar of Pitigal Korale North, and Mr. C. A. Pieris, Superintendent of Dunkannawa. The Society lent the services of Messrs. Wickremaratne, Madanayake, and Karunanayake (Agricultural Instructors), who rendered material services. The Director of Agriculture, the Secretary of the Ceylon Agricultural Society, and Mr. G. Harbord, Superintendent of the Experiment Station, Peradeniya, were present on both days and helped in the judging. A conference for the benefit of local residents interested in agriculture was arranged on the second day, and was well attended. The Director of Agriculture, by request, spoke on tobacco, coconuts, and cotton, and various questions affecting the agriculture of the district were discussed.

The show, which exceeded all expectations, was prettily set, excellently managed, and fulfilled its object in serving the interest both of the planting and native agricultural communities.

The Wellaboda Pattu (Galle) Show, fixed for December 20 at Ratgama near Dodanduwa, has been postponed till February.

The final settlement of the accounts of the All-Ceylon Exhibition held last July has shown a substantial credit balance as was anticipated. No arrangements have been made for holding a Show at Nuwara Eliya this year.

PADDY (RICE).

Mr. J. A. Wirasinghe, Mudaliyar of Rayigam korale, has furnished a report on the cultivation of paddy (*a*) after ploughing with a light iron plough (Meston) and (*b*) according to native methods. Five centres were selected and ploughing was done by Agricultural Instructor L. A. D. Silva, equal extents of land being cultivated under each system. In every instance but one (in which the yield was the same) the ploughed land gave an increased yield which varied from 4 to 15 bushels per acre. A detailed table of results was published in the November "Tropical Agriculturist." These results are interesting and go to corroborate the experience in Bengal, which is contrary to that in Mysore.

It may be here recorded that so far back as 1887 a series of experiments was instituted with the Howard "Cingalese" plough (weight about 32 lb.) when the following results, verified by Government officials, were obtained:—At Toppur (Eastern Province), while native hoe-cultivation gave 20 bushels, the use of the iron plough raised the yield to 39 bushels, and both ploughing and transplanting gave 54 bushels; at Mulaittivu (Northern Province) the results were 14, 28, and 54 bushels respectively; at Minuwangoda (Western Province) they were 17½, 32½, 40; at Pannipitiya (Western Province) native hoe-cultivation gave 25 bushels, while with the iron plough 41½ bushels were secured.

Mr. Molegode, Agricultural Instructor (Central Province), reports:—"In the greater part of Harispattu it has become the rule rather than the exception to transplant from beds. I have verified over 200 acres of paddy transplanted this maha season, and in several places I had plots transplanted under my supervision. In this connection it may be mentioned that the old practice of putting several plants in each hole at close distances is being gradually given up for planting at a greater distance with single or two seedlings." In a later report Mr. Molegode reports that 400 acres were planted with seedlings in Udagampaha and Pallegampaha korales, in Lower Dumbara.

A series of experiments in the manuring of paddy with artificials is being conducted under the supervision of the Mudaliyars of the Kandaboda pattu and Gangaboda pattu (Matara) at the instance of Agricultural Instructor N. Wickremaratne.

A sample of dry mountain rice, known as Tsimakata, was received from Mr. Stuart R. Cope, and is coming up nicely at the Government Stock Garden, where also a crop of Molagu-samba paddy, sown in drills, is now in ear.

The Director of Irrigation has collected some useful statistics in connection with the ravages of the paddy fly (*Leptocorisa acuta*), and the means of minimizing the damage done is engaging the attention of the Director of Agriculture and his staff. The fly season extends from February to May, and it is thought likely that, with the co-operation of paddy cultivators and the irrigation authorities and the assistance of the Agricultural Department, it might be possible to avoid the critical period.

The following return has been kindly furnished by the Superintendent of Census:—

Occupation.	Total		Earners.		Dependents.	
	Males.	Females.	Males.	Females.	Males.	Females.
Paddy land owners	327,154	288,873	161,246	39,106	165,908	249,767
Land owners (otherwise unspecified) ...	12,820	11,831	5,675	2,665	7,145	9,166
Total ...	339,974	300,704	166,921	41,771	173.053	258,933

Mr. Molegode furnishes the following statement of expenditure and income from an acre of paddy (two pelas sowing in extent) cultivated by him in Harispattu:—

Expenditure.	Rs.	*Income.*	Rs.
Preparation of land ...	14	Yield for maha season, 40 bushels at Rs. 2	80
Sowing in nursery and transplanting	5	800 bundles straw ...	12
Reaping ...	4	Yield for yala season, 30 bushels at Rs. 2	60
Thrashing and winnowing ...	7	600 bundles straw ...	9
Handling straw ...	2		
Seed paddy ...	5		
Expenditure on each cultivation	37	Income for both cultivations ...	161

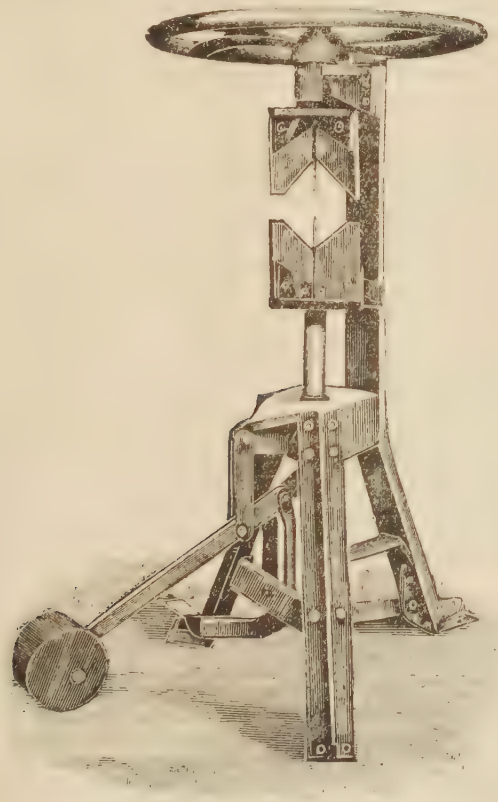
Allowing Rs. 74 for the two cultivations, there was a credit balance of Rs. 87 for the year.

COCONUT CULTIVATION.

Professor Dunstan, Director, Imperial Institute, has transmitted some useful information with reference to the latest developments in machinery for treating coconuts, especially with regard to the separation of the husk, which at present is wrenched out by hand with the aid of a spike struck in the ground.

Fr. Haake of Berlin quotes 260 marks for a machine, which is thus described:—It consists of two sets of cone anvil cutters, arranged one above the other, each consisting of three radially-placed blades, of which the lower cutter may be adjusted vertically by means of a lever and can be fixed in such a manner as to prevent it from turning, whereas the upper one is worked by means of a hand-wheel. The coconut is placed, point uppermost between the blades, and then the lower cutter is pressed upwards by setting the foot on the counter weights. This causes the blades, which are exactly opposite to one another, to cut into the layer of fibre as far as the hard shell. By causing the upper cutter to revolve by means of the hand-wheel, the entire layer of fibre is divided into three long longitudinal segments which can then be easily removed by hand. This process does not present the slightest difficulty with fresh coconuts, so that a skilled workman can remove the fibre from as many as 100 nuts in an hour.

The illustration below will better explain the structure of the machine:—



A meeting of coconut planters summoned by the Director of Agriculture was held at the Council Chamber on December 16, 1912, when a resolution was passed that it was desirable to establish a coconut trial ground with a view to solving various practical problems connected with the cultivation of the coconut palm. The matter is engaging the attention of the Director, and important results affecting our most staple industry are likely to follow.

COTTON.

Allen's long staple cotton has been selected as the variety to be cultivated this season.

The Agricultural Instructor at Batticaloa reports:—"Cotton cultivation in Samanturai division is promising, and as many private cultivators were willing to grow it on their chenas, I procured 50 lb. of seed for their use."

Society's foundation mill with a view to securing a similar machine if results have proved satisfactory. He expresses a desire to standardize the size of the hive, frame, &c., so as to facilitate the manufacture and sale of bee-appliances if the local bee industry becomes popular. A meeting of the local Bee Committee has been summoned to consider this question.

SERICULTURE.

The following report on samples of Bengal Nistari silk and Eri silk produced at the Peradeniya Silk farm has been received from the Salvation Army Silk Expert at Bengal :—"I have examined the silk and find them to be as good as any that is produced in the Bengal steam filatures. I do not think I have any suggestions for improvement. The spun eri silk is of good quality and ought to fetch a good price. I think Brigadier Jivanandham might buy the yarn as he utilizes it for weaving. As I wrote to you once before, the cloth that is turned out from this yarn is of a dull lustre, good for suiting, and fetches a good price. Its durability, as you know, is proverbial.

The management of the farm arranged an attractive display and gave an excellent demonstration of the process of silkworm rearing and silk spinning at the Chilaw-Puttalam Show held on December 13 and 14 last.

Commissioner Booth-Tucker of the Salvation Army visited the silk farm on January 8, and also had an interview with the Director of Agriculture and the Secretary of the Society on the same day.

Mr. Booth-Tucker has gone fully into the details of the silk industry, and with his Indian experience is hopeful of establishing sericulture as a home industry in the Island. He showed excellent samples of mulberry, eri, and muga silk from the Salvation Army farms in India. If the Commissioner's scheme for the housing of Colombo beggars and vagrants fructifies, it is intended to make sericulture one of the chief means of employment.

One of the difficulties experienced with mulberry silk culture in Ceylon is that Buddhists object to destroying the grubs, but those who have these scruples can allow the moth to escape and sell perforated mulberry cocoons which fetch a better value than eri-cocoons and also breed for seed (eggs).

It is a common belief that mulberry trees must be of same size and age before they can be held as a source of food. This is not the case: mulberry cuttings can be grown like tea bushes, and will be available for plucking in a few months.

INVESTIGATIONS.

The Director of the Imperial Institute has furnished the following report on a sample of soy beans grown at Jaffna from seed imported from Java :—"The sample consisted of small black seeds mixed with some brown immature seeds and some impurities. Yield of oil 14·5 per cent. Yields of from 13·3 to about 22 per cent. have been recorded for soy beans, the usual amount being about 17 per cent. The oil possessed the characteristics of soy bean oil. The oil was not submitted to chemical examination. The current price of soy beans at Hull is £8 13*s.* 9*d.* per ton (August, 1912). The present sample would not realize such a high price, owing to the dark colour of the seeds and their small size, the low yield of oil and the presence of foreign material. It would be advisable to cultivate in Ceylon the more valuable ordinary yellow commercial variety of soy bean in preference to this small-seeded kind. A sample of the yellow variety is forwarded with this report." Unfortunately, the light coloured variety does not thrive at lower elevations, where the black seeded variety does so well. Arrangements are being made to try it at higher elevations.

The following is a report from the Director, Imperial Institute, on specimens of roots of the Kirilla mangrove forwarded by the Secretary :—"With reference to your letter No. 2,137 dated August 21 last, forwarding specimens of the 'root-branches' *Sonneratia acida*, I have to state that, as you suppose, these roots serve to supply the submerged parts of the tree with oxygen. They are consequently provided with special breathing pores and possess a well-developed system of intercellular spaces, to which their lightness is due. Such roots or pneumatophores are very common on trees of the mangrove swamps. An illustrated account of them will be found in 'Plant Geography' by A. F. W. Schimper, English edition, pages 73, 401, in which further references to literature on the subject are given.

A description of certain light woods of this kind is contained in the article on "The Utilization of Light Woods as Cork Substitutes," which was published in the "Bulletin of the Imperial Institute," Vol. II. (1904), pages 225-229.

On January 18 a sample of 6 lb. of *Sterculia fœtida* (telambu) nuts were sent to the Imperial Institute in order to ascertain whether there is any likelihood of finding a market for edible nuts or for their oil extraction. Professor Dunstan's report dated October 10 is as follows :—"Fruit measuring about 1 inch in length and ½ inch in diameter, consisting of (1) a dark gray, thin papery outer skin (epicarp), enclosing (2) a thin layer of pale brown pulp (mesocarp), surrounding, (3) a seed with a very tough, shiny, dark shell, and a soft,

creamy white kernel. The fruits consisted of epicarp 2·5 per cent., mesocarp 16 per cent., shell 33 per cent., and kernel 48·5 per cent. The kernels yielded 52·1 per cent. of oil. equivalent to 30·8 per cent. expressed on the seeds, or 25·3 per cent. expressed on the whole fruits. Pale brownish, liquid oil, with a faint, not unpleasant smell, and no distinctive taste.

	Present Sample.	Figures recorded by Bontoux.
Specific gravity at 15·5°C...	0929	—
Saponification value	192·5	173·4 to 174·3
Iodine value per cent.	87·0	81·4 to 83·1

"It is impossible that these *Sterculia fœtida* fruits would find a market in Europe as an edible product. From the present sample they would not appear to be very inviting either in odour or in appearance, whilst the kernels, which cannot be removed from the shells without considerable difficulty, do not show any superiority over those of numerous other edible nuts which are already imported into Europe in large quantities.

"The oil yielded by the kernels is a light-coloured, non-drying oil, which might find a market for soap-making or, possibly, even as an edible oil. It possesses the somewhat unusual property of being suddenly converted into a gelatinous solid when heated to a high temperature, and for this reason is of considerable scientific interest. It would be worth while to make a detailed examination of the oil with a view to determining the nature of the fatty acids it contains, and for this purpose a further sample of about 28 lb. of the fruits should be forwarded to the Imperial Institute. From the commercial point of view it is very doubtful whether these fruits would be worth exporting from Ceylon. There is no machine available for shelling them, and if the unshelled fruits were crushed the yield of oil would be small, and the residual cake would contain so much indigestible fibre as to be useless as a feeding material. The difficulties in the way of using the fruits as a source of oil are so great that it would be useless to attempt to interest oil-seed crushers in them unless they are obtainable in very large quantities at a low price."

The Government Agricultural Chemist furnishes the following analysis of Palmyra Fruit Paste (*Pinaldu*):—

	Per Cent.		Per Cent.
Moisture at 100 C.	27 7	Fruit sugar	39·2
Ash	3·5	Cane sugar	4·1
Solubility in water	65 7	Proteids	1·9
Containing ash	2·8	Nitrogen	0·3
Solubility in alcohol	59·3	Acidity as sulphuric acid	2·3
Containing ash	0·5		

He adds:—"It will be seen from the figures that a large proportion of fruit sugar is present, which is easy of digestion, and thus makes the paste a valuable food product. The low proportion of proteids present suggest the use of the paste along with a nitrogenous food, such as a farinaceous food, so as to obtain a narrower nutritive ratio. If mixed with groundnuts, caju nuts, desiccated coconuts, a palatable confectionery might be produced. The bitter taste is due to resin, probably derived from the woody portion of the husk, but if an improved method of preparation were carried out this would disappear, and the paste no doubt regain its former popularity amongst the Jaffna population."

MISCELLANEOUS.

Acting upon a suggestion made by His Excellency the Governor in a speech delivered at Jaffna, the Director of Agriculture, in co-operation with the Government Agent of the Northern Province, has begun an experiment with Manihot rubbers at Vavuniya. A stretch of land below the bund of the tank has been utilised for the purpose, and 1,000 holes were prepared and planted at stake with the seeds of *M. Glaziovii* and *M. Dichotoma* under the supervision of the Secretary, Ceylon Agricultural Society, assisted by Agricultural Instructors Chelliah and Wickremaratne. No irrigation water is to be employed, the seepage being relied upon to supply the necessary moisture.

A fresh attempt to establish the Indian lac insect was made at the end of September when a consignment of brood lac was received from Pusa through the courtesy of the Imperial Entomologist. This was intended for the Ber or Masan tree (*Zizyphus jujuba*), and was given in charge of Mr. N. Wickremaratne, Agricultural Instructor, who utilized the material for inoculating in the Kandy and Hambantota Districts, with what result remains to be seen. The next consignment expected is intended for Kusum or Kon (*Schleichera trijuja*).

The Chinese cabbage has been well established in some of the school gardens in the Kandy and Badulla schools, notably at Gunnepana in the Dumbara district, where it has produced an abundant crop of seed. The plant is one that commends itself to the native dietary, and is likely to become popular. It was introdnced early last year.

Mr. N. M. Jayasuriya, Agricultural Instructor, made the following report after visiting a garden where vegetables were said to be damaged by black ants:—"The ants are those

commonly found in compounds and grassy plots. I found their nest at the roots of the plants where they disturb the soil and expose the roots. After disturbing the nests I applied a solution (1 oz. to 2 gallons water) of Vermisapon with a watering can, and found this treatment answered well, as it resulted in the death of the ants."

The Government Entomologist identified the ants as *Solenopsis geminata*, and suggests pouring a little bisulphide of carbon into the nest, if necessary after making an opening with a pointed stick, and then covering over with a board or a piece of wet sacking.

A report was received that at Ambalantota cotton seeds planted were being eaten up by rats. On referring the matter to the Government Entomologist, that officer wrote :—"It would be highly dangerous to sow rat poison about in the cotton fields. If rats are nesting in the neighbourhood, the carbon bisulphate treatment might be tried, as employed in the paddy fields. Otherwise native traps should be used. Possibly Vermisapon dribbled into the ground round the seed might act as a deterrent."

An inquiry from the Maldivian Government Representative as to the feasibility of growing Para rubber in the Islands was referred to the Government Agricultural Chemist, who reported :—"I believe the soil on the atolls is mainly carbonate of lime mixed with sand, and it is doubtful how far Para rubber could be successfully grown under the soil and weather conditions prevailing."

Messrs. Lee, Hedges & Co., Baillie street, Colombo, are prepared to supply explosives for use in agriculture, and furnish information about "Ergite," "Gelignite," and "Cheddite."

The Government Entomologist reports as follows on a specimen of locusts said to be destroying the leaves of young coconut plants in Kurunegala District :—

"The insects are examples of the spotted locust (*Aularchus militaris*). For description and an account of this pest, with suggestion and for remedial measures, I would refer your correspondent to our Royal Botanic Gardens Circular, Vol. III., No. 16 (July, 1906)."

The Government Entomologist also reports on scale insect found upon orange and coffee plants in the Bandarawela district :—"The insect is *Lecanium viride*, which is always accompanied by the "sooty fungus" that vegetates upon the saccharine excreta of the coreid. Dry lime, ashes, or sulphur are useless against coreidæ, but lime water acts as a contact poison and will kill the insect. Soapy insecticides, such as "Kerosene emulsion," "Vermisapon," or MacDougall's Insecticide are the most convenient insecticides. "Vermisapon," manufactured in India and stocked by Messrs. E. B. Creasy & Co., can be recommended both on account of economy and effectiveness."

The Government Entomologist makes the following report on white ants attacking orange trees on Batticaloa estate, where the trees are said to be dying out :—"White ants will never attack a healthy orange tree. In the case in question the tree must have been suffering from a fungal root disease. As soon as the roots are dead or badly diseased, they will be attacked by white ants. Orange trees, in this country, appear to have a limited life. After they have come to maturity and borne good crops for some years, they usually succumb to 'Die back' and root disease, which are very difficult to prevent or cure."

The Director of the Science and Agricultural Department, British Guiana, advises the despatch of cuttings of the following varieties of sugarcane :—Nos. 118, 419, 721, and 167. It may be mentioned that the variety known as B.208 is making good growth at the Government Stock Garden, and that cuttings will be shortly available for distribution.

C. DRIEBERG,
Secretary, Ceylon Agricultural Society.

February 3, 1913.

SESAMUM CROP OF THE PUNJAB.

FINAL FORECAST OF 1912.

The Director of Land Records, Punjab, under date 30th December, 1912, reports that the total area under sesamum in 1912 amounts to 150,000 as compared with 92,100 acres in 1911. The estimated areas in the first and second sesamum forecasts of 1912 were 91,500 and 82,700 acres respectively, a sufficient allowance was not made in the district estimates for the much more favourable conditions at sowing time this year than last.

YIELD.

Owing to the early withdrawal of the monsoon most districts report a yield more or less below the normal, but in spite of this the gross outturn is estimated at 300,066 cwts.

PRODUCTION AND CONSUMPTION IN 1911.

The production of sesamum, as estimated in the final forecast of 1911, amounted to 268,656 maunds, while the trade returns for the year ending September 30th, 1912, shew a net import of sesamum of 33,112 maunds.

VOTE OF THANKS TO SIR HENRY McCALLUM.

AT THE AGRICULTURAL BOARD MEETING.

The Hon. Mr. P. ARUNACHALAM in proposing the vote of thanks to H. E. SIR HENRY MCCALLUM at the meeting of the Board of Agriculture on 3rd February, said :—

Your Excellency.—Since the last meeting of the Society we have suffered a very great loss by the departure from the Island of its President, His Excellency Sir Henry McCallum, preparatory to his retirement which will take effect before we next meet again. It is, therefore, right on this occasion to place on record our thanks to His Excellency for the great and valuable services which he has rendered to the Agricultural interests of this Island and to this Society. I have very great pleasure in proposing this vote of thanks which I am sure you will all accept unanimously and with acclamation. It is not merely a formal vote to a retiring president, but is intended to be a warm and grateful acknowledgment of the obligations under which His Excellency has placed us. During his eventful administration, there was no sphere of the public service on which has been left a more enduring mark than on agriculture by his ability, insight, devotion and zeal. What he has done for us is so well known and appreciated that it is not necessary for me to refer to it except briefly. When His Excellency the Governor arrived in the Island, in the latter part of 1907, this Society was in its infancy, and there were not a few who doubted whether it had sufficient stamina to survive the departure of its parent and founder, Sir Henry Blake. Sir Henry McCallum made a careful survey of the circumstances, and satisfied himself that it was fulfilling a useful purpose and deserved encouragement. Having arrived at this decision, with characteristic energy he set himself to take steps which have given this Society a new lease of life and placed it in its present vigorous position. He realized very early that a very important part of the work of this Society in familiarising peasantry with improved methods of agriculture was hampered by lack of sufficient machinery. He provided more agricultural instructors and supervisiors—six for the Sinhalese and three for the Tamils,—made them itinerate throughout the villages disseminating the latest information as to soil, manures, new products, live stock, &c. He gave an impetus to school gardens familiarising the rising generation with agricultural work and ideals and to some extent checking the growing disinclination among them for manual labour. He made legal provision for the establishment of co-operative societies—a scheme which promises to be of the greatest usefulness to our agricultural population. He encouraged shows beginning with that at Mirigama and culminating in the striking success of the All-Ceylon Exhibition held in July last. I think the people of the Northern Province can never forget what he did for them when the tobacco industry of Jaffna was threatened with extinction, and ruin stared thousands in the face, owing to the heavy duties which were imposed on Ceylon Tobacco by the Government of Travancore. His energetic interference resulted in the reduction of those rates. During an early stage of his *régime*, the coconut industey was seriously threatened by the bleeding disease. Sir Henry McCallum, who was much concerned, ordered a very careful investigation and precautionary measures by the Government

Mycologist, which resulted in the disease being stamped out. He devoted a great deal of attention and time to schemes for the cultivation of cotton and tobacco in the Anuradhapura District, and it was a disappointment to him that in spite of the time, labour and money devoted the schemes did not meet with the success they deserved, owing I believe to climatic and other reasons. But it is by experiments, even by failures, that progress is achieved. It must have been great satisfaction to Sir Henry McCallum that he was able, before he left the Island, to make permanent provision for the future of Ceylon agriculture, by the creation of the Agricultural Department, and by organising a scheme for agricultural education. The department is under the competent direction of Mr. Lyne, and promises to be a great success. The Governor took great pains in selecting students to be sent at Government expense for agricultural study to Poona. They will on their return form the nucleus of the teaching staff in the agricultural schools, which Dr. H. M. Fernando just referred to and which Sir Henry McCallum proposed to establish in the various provinces and hoped to see crowned by a great College of Tropical Agriculture to form part of the new University of Ceylon. I will not touch on what Sir Henry McCallum did for the development of roads and railways, which are so indispensable to agriculture. I will only say that if Sir Henry McCallum had done nothing else, he will, by what he has done for agriculture, live in the grateful recollection of the people of Ceylon among whom agriculture is the oldest and most honoured of professions. (Applause.) Our gratitude to him is tinged with sorrow when we remember that in working so devotedly for Ceylon he has sacrificed his health, and we can only offer our earnest prayer that, with the rest and quiet he now enjoys, he may soon be restored to health and to the service of the Crown in a higher sphere. (Applause.)

Mr. Dunuwile Seconds the Vote.

In the absence of Sir SOLOMON DIAS BANDARANAIKE, who was to have seconded the vote of thanks, Mr. WM. DUNUWILE, Dissawa did so, and in seconding the vote of thanks he said :—Your Excellency, I have great pleasure in seconding the vote of thanks, proposed by Mr. Arunachalam and to endorse every word of what he has stated. Who is there that does not know the warm interest that Sir Henry McCallum has taken in agriculture and in point of fact in all matters that affect the advance of our material interests: he took great delight in studying the history and tradition of the various peoples of this country. What is more, Sir, with the true instinct of the born ruler of men, he even acquainted himself with our manners, customs, and national feelings and susceptibilities which he always took care never to hurt. The community to which I belong, I need not say, will always remember Sir Henry McCallum with gratitude.

Mr. Beven Supports.

MR. FRANCIS BEVEN who supported the motion said that it did not often happen that any proposition moved by his hon'ble friend on the right left anything that could be usefully said in its support, and his friend the Dissawa had acknowledged it by the brevity of his remarks as seconder. His sole object in supporting the motion was to dispel the official flavour which may otherwise attach to a resolution moved by a member of the Executive Council of Sir Henry McCallum and seconded by a gentleman who was till recently connected with the service of Government. There were people who might say that that was an entirely official programme, that the silence of the unofficials on the vote did

not mean consent, or at any rate that their assent was lukewarm. It was necessary to anticipate such objections. The unofficial members of the Board, he felt sure, were quite at one with the proposer and the seconder in what they had said; but there was one point which he wished to emphasize in connection with that motion. Sir Henry had not come to them with any predisposition in favour of the Agricultural Society. He did not know whether the members of the Board were aware that at one time it was thought that Sir Henry McCallum was rather hostile to the pet scheme of his distinguished predecessor, Sir Henry Blake. He came here imbued with large schemes for the welfare of the country. He had set to work on his arrival to collect materials for a five years' programme of great works, and for that several millions were necessary; and he tried to find out whether there were any leakages. Either he was advised by somebody that the money spent by Government on the Association was money wasted, or his eagle eye detected a large unusual vote in connection with the Society; and a memorandum was submitted by him, in which it was suggested that Government aid should not be necessary, or certainly that it should gradually cease, and that there was no reason why the Society should not be self-supporting. It had fallen to him as one of the members of the Financial Committee, to point out in reply to the memorandum that we had here no moneyed and leisured class; that our so called millionaires could be counted on the fingers of one hand; that most of the members earned a moderate income; many of them had uncertain incomes; that we were not a philanthropic institution but that we had accepted Governor Blake's invitation to join the Society, as we thought we would be benefited by the interchange of views at its meetings, and by studying the Society's Magazine, and that while benefiting overselves, we would be able to benefit our less instructed neighbours by setting them an example in improved cultivation, by taking an interest in their work, and by encouraging village agricultural shows. If Government support was to be withdrawn they might at once shut up shop. Sir Henry McCallum was often very tenacious in some of his views, but in the matter of the Society he had subordinated his original bias and given the Association every possible support with that vigour and earnestness which always characterised him. The evidence of his interest in our work was found in the high terms of commendation in which he always referred to the work of the Secretary on behalf of the peasant classes, in his own active and practical interest in the All-Ceylon Exhibition, which was such a splendid success, and finally in his establishment of the Department of Agriculture which would benefit the masses. His services were certainly deserving of the fullest approval of the Society. His last words to the Kandyan Chiefs in reply to their farewell address were an exhortation to them to do their best to discourage intemperance among the peasantry by giving their support to the Excise Scheme. There were many who did not approve his designed methods towards encouraging temperance, but his interest in the village population, as expressed in those last words, remained to the last and it gave the speaker particular pleasure, as one who had not been able to see eye to eye with Governor McCallum on Excise Reform, to associate himself with a vote which recognised his great services to the cause of agriculture. It was with the idea of removing or anticipating any false impression that the resolution was a formal one that he supported it, although there had already been a presentation by the Board to Sir Henry McCallum before his departure. (Applause.)

THE POSSIBILITIES OF PROFITABLE CULTIVATION.

IN THE DRY DISTRICTS OF CEYLON.

Following the meeting of the Board of Agriculture at the Council Chamber on 3rd February, the Agricultural Society held its meeting, at which papers were read and discussed by the members. Dr. H. M. Fernando read the following paper on the possibilities of profitable cultivation in the dry districts of Ceylon :—

Even a casual survey of the climatic conditions which prevail in this Island reveals three distinct zones differing materially from one another in climate, in rainfall, and in vegetation. These three zones are the moist and dry low-country areas and the area of the hill country. Leaving the hill country out of consideration, the moist low-country is situated in the south-west of the Island. It is in this belt that cultivation has been practised without the help of irrigation, and where perennial products, like the coconut palm, tea, rubber, &c., have been successfully cultivated. In contrast to this region the dry zone covers an immense acreage. It occupies perhaps more than half the extent of the Island, and remains to this day either as densely wooded jungle or barren waste, except where irrigation water exists, or where, as in the peninsula of Jaffna and in a narrow strip of the eastern seaboard, a water-bearing subsoil is found within a few feet of the surface.

It must be borne in mind, however, that these dry districts maintained a teeming population during the period that Anuradhapura and Polonnaruwa prospered as the captial cities of the Sinhalese kingdom. It is here that we meet with these stupendous irrigation works, which still command the astonishment and admiration of modern engineers. But the cultivation at the remote period referred to was almost entirely restricted to rice and dependent on artificial irrigation. My purpose to-day is not to deal with this form of cultivation, but to confine my remarks entirely to the possibilities which exist for dry cultivation throughout the extensive area where irrigable water is not available. The meteorological returns indicate that over the dry zone the annual rainfall is seldom less than 40 inches, and in some parts may reach the respectable amount of 50 inches or more. When contrasted with many parts of India, such a rainfall would be considered excellent, and quite capable of yielding crops of grain and other products without irrigation water. Even in Ceylon chena cultivation is quite common in this region, and is often a source of some profit to the villagers where facilities for the sale of produce exist. In the Sinhalese districts continued cultivation year after year of the same land is almost unknown. The spasmodic efforts characteristic of chena cultivation are wasteful, uncertain and inefficient. Before discussing the nature of the agricutural products which may be grown, the distribution of the rainfall requires further comment.

Distribution of Rainfall.

Whilst the annual rainfall is as much as 40 or 50 inches, the bulk of this falls within the months of October-January. This period is followed by a short drought to be succeeded by a period of gentle rains in April-June, and then follows the longest drought of the year. It is evident, therefore, that the chief difference between the dry and moist low-country zones is the failure of the south-west monsoon. The north-east monsoon is quite as fruitful in these parts as over the rest of the low-country. It is quite possible then to obtain at least one crop without difficulty. The April-June rains are fitful and uncertain, but even these, despite the crude methods of the chena cultivator, render a quickly growing crop of legumes or seasame possible. Of grain crops, kurakkan and other small millets as well as maize are commonly grown. In the Batticaloa District, along the road from Bibile to Eraur, numbers of chenas of maize can be seen during the north-east monsoon planted on the areas where young teak plantations have been started by the Forest Department. Such lands, I understand, are cropped for three years in sucesssion with maize or similar crops between the teak saplings, and yet prove remunerative. I venture to suggest that there are great possibilities in these districts for the practice of farming on a carefully devised system of crop rotation. At present the villager in carrying on chena cultivation practises no tillage of the soil He takes no care whatever for the conservation of soil moisture nor of its fertility. After burning the forest or scrub the seed is sown broadcast and left to sprout and grow with the monsoon rains. A little hand-weeding is practised, and the crop is gathered in due season. The rainfall, which is found sufficient under these primitive conditions, I contend, will more than suffice when the methods of modern dry cultivation, which have been elaborated in countries like Australia and the western portion of the United States, are applied.

Crops Suitable for Cultivation.

In addition to the crops now grown by the villagers, many other products may be mentioned as suitable for these districts. For my purpose, however, I will only refer to two important items, fodder crops and cotton cultivation. Forage is a severely felt want in Ceylon. No attempt has yet been made to raise fodder crops, although hay is a regular

article of commerce in India, and suitable fodder crops are extensively cultivated throughout that country from the north to the south. The most important hay crop of the neighbouring continent is the Great Millet or Juar. It grows well in Ceylon, and I understand that it is a regular chena crop in a few isolated districts in the Province of Sabaragamuwa. In strange contrast to India, we have to import hay from Australia at considerable cost for our horses. Our cattle are fed on imported oil-cake chiefly and on locally-grown paddy straw, which from a point of feeding value is almost worthless. Apart from this consideration that a forage crop will supply a keenly felt want in the agricultural economy of Ceylon, the fact that such a crop requires less moisture for its harvesting than a crop for grain is an additional attraction when dealing with a country of exiguous rainfall. The other item I wish to refer to is "cotton." I need not remind this Society that under the auspices of the British Cotton Growing Association considerable interest was manifested in this product about eight or nine years ago. Several private individuals experimented with this crop in the west and in the east of the Island. Moreover, with the establishment of the Maha-iluppalama Experiment Station cotton was tried for several years by Mr. C. J. C. Mee. The Maha-iluppalama experiments were confined to the growth of cotton under irrigation according to the Egyptian system. They were on the whole a failure. This was due partly to want of labour but chiefly to the fact that the rainfall on the experimental station was unfavourable for growing cotton under irrigation On paddy fields irrigated by tank water cotton cannot thrive during the monsoon rain as the land is water-logged. When, however, the growth is started with the drought in January or February with irrigation water, showers are encountered in April and May, which damage the harvesting. On the other hand, on high ground with a natural drainage the north-east monsoon rains are admirably suited for the growth of cotton. If planted in October, the crop can grow with rain, and the drought which can always be counted upon in February and March will enable the crop to be gathered without damage. It is a pity that side by side with the attempt to grow cotton under irrigation another experiment to grow it in high land with the natural rainfall was not undertaken at Maha-iluppalama.

Kurunegala Experiments in Cotton.

I may mention that my experiments in the Kurunegala District for over five consecutive years were successful as far as they went. The rainfall did not interfere with the growth or the picking of the crop. The only reason for discontinuing this cultivation was due to the fact that the land being hilly and steep was unsuited for cotton, which is an arable crop, and requires careful tillage of the soil to produce the best results. This brings me to another point which I wish to specially emphasize—a fact which most of us did not appreciate in starting cotton cultivation in Ceylon. Unlike perennial crops like tea or cacao, cotton is an annual crop. It cannot be cropped year after year on the same land without considerable deterioration. In Egypt, where the rich alluvial farm land yields two or three crops a year, cotton is grown only once in two or three years. In America it is grown in rotation with Indian corn and other crops. If, therefore, cotton cultivation is to be established successfully in Ceylon, it is essential to adopt a system of farming in the dry zone wherein cotton is one of the items of the farm rotation. The breeding of cattle and other live stock is another item, for which possibilities exist only in the dry zone. In the moister districts the land is under permanent crops, which offer no opportunity for the maintenance of ordinary farm stock. The want of such opportunity at present is a serious drawback to the complete development of our agriculture. This, then, is an additional reason for the necessity of the exploitation of the drier districts. Recently the Director of Agriculture in one of his admirable addresses to pla ters discussed the question of opening an experimental station near Anuradhapura. I would suggest that in the experiments carried out there a scheme of farming as adumbrated in this paper be undertaken. The problem is a novel one for Ceylon. Capital and enterprise are seeking "fresh fields and pastures new." But unless definite data are available from reliable experiments conducted under scientific guidance, they will not be attracted to these arid and isolated wastes.

H. M. FERNANDO.

The Discussion.

Mr. LYNE, Director of Agriculture, who presided, invited discussion.

Mr. A. W. BEVEN, who said he took great i terest in all forms of cultivation, was of opinion that nothing had been done for dry cultivation by the Society since its inauguration. His lot was cast for the past sixteen years in the dry zones of Ceylon, where long droughts were experienced. He had suggested the establishment of garden plots for the purpose of giving object lessons in dry cultivation, but the suggestion fell on deaf ears. He considered that it was necessary to give those lessons and teach the people, if possible, to overcome the difficulties experienced in dry zones on estates. He regularly got the land ploughed, and thus was able to preserve his land from the serious effect of the drought they all experienced in the district. The soil was kept in proper and loose tillage. In a place called Magal Eliya, about 13 miles from Puttalam, a field covered with *iluk* was converted into good arable land by the removal of the *iluk* and loosening of the soil. They had an experimental station in Maha-iluppalama. They should have one in the North-Western Province as well, which would be very useful. He noticed an omission in Dr. Fernando's paper—tobacco was not mentioned, Tobacco was

in the Northern, Eastern and North-Western littoral, but the fields were flooded with water, both morning and evening, while cattle manure was also used. It was a sort of forced grown tobacco which resulted and which was fit only for chewing purposes. He supported the idea of establishing experimental stations in dry zones of the Island.

THE QUESTION OF FODDER.

Rev. Father COOREMAN, who came from Hambantota, suggested that some provision be made for the establishment of an experimental station for the benefit of the landowners and peasants of Hambantota and Tissamaharama Districts. There, he said, the question of fodder was a very important one. During drought, cattle had practically nothing to eat, and especially draft cattle had to be fed well. He hoped that the question of fodder would be taken up by the Society, and that the Hambantota and Tissamaharama Districts would not be forgotten.

POPULAR VILLAGE INDUSTRIES.

Mr. KELWAY BAMBER was of opinion that it would be some time before the villagers inhabiting dry zones would be able to do anything on a big scale to improve existing conditions. They should be able to cultivate some product which would enable them to produce something in order to obtain better food. He would suggest the cultivation of the castor oil plant. Over 13,000 tons of castor cake was imported annually, and if the castor oil plant was cultivated in the dry zones, where it grows wild as a weed, a good income could be secured. The villagers would do well to cultivate it, and would be able to offer the seeds for sale. Central stations could be established, by preference, railway stations, or sometimes dispensaries and factories, where the villagers might bring in their produce and obtain money. There was quite a large demand and good price—say ten to twelve cents per measure—might be earned. Then he suggested charcoal burning. In the vast forests in the dry zone there was a special kind of timber which was used for no other purpose, and which was specially adapted for charcoal burning. That would be another profitable industry. The charcoal was worth Rs. 30 a ton and could be produced at a cost of about Rs. 10 or Rs. 12 a ton. The Forest Department should make experiments. The demand for charcoal was great at present than it was hitherto, as in recent years suction gas engines were being used. Besides being a profitable industry, it should bring in an additional revenue to Government by imposing a light tax on the timber, and also by transport charges on the railway.

Mr. LYNE in winding up the discussion pointed out that Cotton was grown under irrigation only once at Maha-iluppalama, namely in 1909, and that the causes of failure of cotton at that station as recorded in the Administration Reports were shortness of rain in the planting and growing season, continuance of rain during anticipated dry period, unsatisfactory growth and uneven flowering produced by irrigation, bad seed, ravages of insects, and strong winds.

Mudaliyar A. E. RAJAPAKSE added that when the experimental stations were opened, they would be useful as training grounds for estate employers, such as managers, conductors, kanganies, etc.

AGRICULTURAL STATISTICS FOR BRITISH INDIA.

A summary of the agricultural statistics for British India for the quinquennium ending with the season 1910-11 has just been issued by the Indian Government. The percentages of the area of British India for this and the preceding quinquennium show an approximately constant subdivision as follows :—Forest, 13 per cent. ; not available for cultivation, 25 per cent. : culturable waste, 19 per cent. ; current fallow, 7 per cent. ; net area cropped, 36 per cent. Roughly 17 per cent. of the cropped area, which is sometimes cropped twice, is irrigated. About 90 per cent. of the cropped area is constantly devoted to food grains, and includes 35 per cent. to rice, 10 per cent. to wheat. The acreage devoted to cane-sugar has remained steady at 1 per cent. ; but that devoted to cotton, which is about one-twentieth of the cropped area, shows an increase for the last quinquennium as compared with that which preceded it. Indigo culture has steadily declined during the ten years, until the acreage in the last season was but one-third of the acreage ten years previously; this decline has been most marked during last five years in Madras, and least marked in Bengal. The acreage given up to opium has declined also within the five years to about two-thirds of that of the earlier period. The acreage devoted to coffee is also smaller, and those given up to tea and tobacco have been increased. Tables are given regarding the average yield per acre of certain crops in certain districts ; these show that irrigated land gives an increased yield over unirrigated land for rice in Madras (20 per cent.), Punjab (40 per cent.), and for wheat in the United Provinces (45 per cent)., and in Bombay (100 per cent.).—*Nature*, December 19, 1912.

WORKING OF A CO-OPERATIVE CREDIT SOCIETY.

[Paper by C. RASANAYAGAM MUDALIYAR, read before the Ceylon Agricultural Society at its Quarterly Meeting on February 3rd, 1913.]

When the Dumbara Agricultural Society was formed in the early part of the year 1906 with the purpose of improving the condition of the village cultivator, representations were made to the Society that their efforts should be directed to extricate him from the clutches of the usurer if any attempt was to be made to improve his condition. The village money-lender was a long-established institution in the district, and his policy was to ingratiate himself into the confidence of the *goiya* by making him loans and ultimately become the owner of the *goiya's* lands. The rates of interest charged by the money lender on loans of seed paddy ranged from 30 to 100 per cent. for a period of six months. The remoter the village and poorer the villager the higher was the rate of interest recovered. Instances were brought to light that in certain villages the person who borrowed a bushel of paddy had to return two bushels at the end of six months, and if he failed to do so he had to supply four bushels at the end of the year, interest and compound interest working at the rate of 300 per cent. per annum. Cultivators of tobacco, too, had often to seek the aid of the money lender, who was generally the supplier of provisions. The rates of interest in such cases ranged from 24 to 45 per cent. on mortgages, and 30 to 60 per cent. on promissory notes. When the cultivator submitted the necessary document, he seldom received the whole amount at once. The amount agreed to be lent was paid weekly in provisions, and the money lender not only recovered the stipulated interest on the whole amount, but also made a profit on the provisions supplied.

Such being the state of affairs, the Society at once set about to discover a means of relieving the helpless cultivator. The matter was discussed at more than one meeting of the Society, and it was decided to establish a Co-operative Credit Society in connection with the Agricultural Society for the purpose of lending seed paddy and money at low rates of interest It was at first intended to start small Credit Societies in several villages, and make the villagers themselves responsible for the recovery of loans, while the Dumbara Agricultural Society acted as an Agricultural Bank. But this was found unworkable owing to the ignorance of the villagers and their inability to conduct business by themselves.

The ways and means to raise the necessary capital were next discussed: whether funds should be got by issuing shares, receiving deposits, or by borrowing the required amount on the collective credit of the members. The first suggestion was given up as it appeared to partake of the nature of a Joint Stock Company, and the last one was discarded as no one could be found who was willing to lend on sufficiently accommodating terms. It was therefore decided to raise the necessary capital by receiving deposits at 4 per cent. interest from the members of the Local Agricultural Society.

Rules were framed to suit the decision arrived at, and on August 30, 1906, a sum of Rs. 420 was received from 22 members as their first deposits. Only a few intelligent members and some headmen joined the Society then and deposited money solely for the benefit of the cultivators, while the villagers who joined did so with a view to raising loans. The difficulties in the formation of such village banks through a combination of the cultivators themselves are three:—(1) They are lacking in confidence, and are unwilling to entrust their money to anybody, particularly in promoting what they look upon as a venture; (2) if they have any money to lend, they would rather give it to their friends or dependents over whom they possess influence, with the prospect of getting better interest than the bank could give; (3) the really needy man who would benefit most by such a society has no money to deposit.

With the first deposit in hand the urgent relief of lending seed paddy was started in Uda Dumbara, where the lowest rate of interest usually charged was 50 per cent. for six months. The Society entrusted 50 bushels of seed paddy to a sub-committee, with instructions to lend out small quantities to the most needy villagers, and all the 50 bushels were disbursed for the maha season of 1906 among 42 persons, all of whom returned the paddy borrowed at the next crop with 24 per cent. interest. The interest charged though high was the rate fixed by the villagers themselves and was readily paid. Very little paddy was borrowed during the yala harvest. In 1908 another paddy store was opened at Mediwaka with 30 bushels of paddy.

In 1906 loans were made to		42	persons amounting to	50	bushels
In 1907	do	53	do	76½	do
In 1908	do	50	do	95½	do
In 1909	do	87	do	131½	do
In 1910	do	101	do	141	do
In 1911	do	111	do	167½	do

During the six years the Society has been at work in Uda Dumbara 662 bushels of paddy were lent to 444 persons, and out of this number 16 (3·6 per cent,) persons (repre-

DANGERS OF OVER-IRRIGATING.

Extract from an Article on the National Irrigation Congress in the "Engineering Record" of New York, for the week ended October 19, 1912.

"From the engineering view point the most interesting papers were those which dealt with the problems of protecting the lands from excessive use of water and from destruction by alkali or swamping. It was shown that the future extension of irrigation is limited not by the gravity supply, but by the relation between the cost and value of pumped water. Especial emphasis was placed on the development of hydro-electric power, and the use of this in pumping water for irrigation and for drainage, and it was shown that the man who is paying for pumped water for irrigation is utilizing it to the best advantage and is producing the largest and most valuable crops.

"On the other hand, the large projects provided with an ample supply of water by storage are being ruined in part by excessive application of water. It is almost impossible to convince the ordinary farmer that he needs to employ more brains and less water to get the largest yield. Already a considerable part of the irrigated area has been swamped. In the San Luis Valley in Colorado, for example, it is asserted that 500,000 acres, including some of what were formerly the best farms in Colorado, have been ruined. In Utah 20 per cent. or more of the lands have been destroyed, and so on in the various irrigated states. All of this comes from careless use of an ample water supply. Drainage is essential, and a drainage system must be provided on all large irrigated tracts unless there are some unusual conditions present."

Experience in Ceylon and elsewhere is similar to that referred to in this extract. An instance of this is close at hand referred to in the following quotations from my Administration Report for 1911-12 :—

"The tanks are still nearly full so that there is no chance of any shortage of water this year."

Under Walawe Scheme the same officer (Divisional Irrigation Engineer, Southern Division) reports :—

"94. Last year, possibly the driest on record, proved a very bad year for many cultivators in the Southern Province, but the paddy cultivators at Walawe had no cause for complaint, reaping as they did a Yala crop of no less than 3,368 acres and obtaining an average return of seventeen-fold, which is a record for the scheme.

"95. There was just sufficient water for the proper irrigation of the fields, and in spite of many complaints from various owners that their crops were drying up, the various tracts of paddy throve as never before. Water was scarce, and different tracts had to be watered in turn at longer intervals than usual. The consequence was that the fields did dry up somewhat and proper aeration of the soil became possible on account of the absence of the usual water seal."

R. W. SMITH,
Director of Irrigation.

Trincomalee, November 28, 1912.

THE PRESERVATION OF WOODEN POLES.

The following are some of the results of various methods of treatment for preserving wooden poles presented in Circular No. 198 of the Forest Service, United States Department of Agriculture. Although the results were not obtained under tropical conditions, they are of interest in the West Indies, where more attention might profitably be given to the subject of timber preservation.

Both the green and seasoned poles butt-treated with coal tar creosote by the open tank process showed practically no decay at or near the ground line.

The poles brush-treated with two coats of coal tar creosote and preservatives sold as Avenarius carbolineum, S.P.F. carbolineum, and wood creosote, showed but little difference in the extent of decay. Their average loss of circumference was 0·02, 0·04, 0·04 and 0·06 inch, and the per cent. affected with decay 14·5, 13·6, 13·4 and 24·0, respectively. The condition of these poles was next best to that of those treated with coal tar creosote in the open tank.

The poles brush-treated, respectively, with one coat of preservatives sold as S.P.F., carbolineum and Avenarious carbolineum showed a much greater loss of circumference at the ground line than those treated with two coats of these preservatives. The average losses of circumference were 0·10 inch and 0·27 inch, and the per cent. affected with decay 30 and 25, respectively.

The poles brush-treated with two coats of preservative sold as creolin and those similarly treated with one coat of preservative sold as wood creosote showed but slight difference in loss of circumference at the ground line, the average loss being 0·42 and 0·43 inch, and the per cent. affected with decay 69·8 and 95·2, respectively.

The poles brush-treated, respectively, with one coat of preservative sold as creolin and coal tar, showed a loss of circumference at the ground line of 0·89 and 0·95 inch, and the per cent. affected with decay of 100 and 98, respectively. The loss with these poles was nearly as great as with the untreated.

The untreated poles were practically all more or less affected with decay at the ground line, the average loss of circumference for those seasoned prior to placement being 1·01 inches, and for those placed green 1·16 inches. That two of those seasoned prior to placement showed no decay at or near the ground line is possibly due to the fact that they were not set on a hillside or slope where the drainage was excellent. One of them was set in broken stone or rock.

A second independent set of experiments gave the following additional results :—

The untreated poles set in crushed stone showed less decay at the ground line than similar poles set in sand, the average loss of circumference at that point being 1·77 inches and 2·27 inches, respectively.

The poles with charred butts showed less decay at the ground line than similar uncharred and untreated poles set in either crushed stone or sand, their average loss in circumference at the ground being only 0·71 inch.—*Agricultural News.*

VEGETABLE OILS.

(Continued from January Issue.)

Castor Oil.

(Ricinus Communis.)

The castor oil plant is cultivated throughout India and naturalised near villages ; it is probably indigenous to Africa. There are numerous agricultural forms of the plant or races which may be grouped under two types : (*a*) A tall bush or small tree of perennial growth, usually planted as a hedge or in lines through fields where it affords shade to other crops. This gives a large seed. (*b*) The other is an annual plant sometimes grown as a pure crop, though more frequently in mixed cultivation. When grown with other crops the yield of cleaned seed per acre is about 250 lbs., and when grown by itself 500 to 900 lbs. It is generally held that the large seeded varieties yield the best ordinary lubricating and lighting oils, and that the small seeded afford the finger grades, especially those used for medicinal purposes.

Leather has examined a large number of seeds from Madras, Bombay, United Provinces and Central Provinces, and shows that they contain from 25 to 35 per cent. of shells ; and the kernels, with few exceptions, afford from 60 to 70 per cent. of oil, or 35 to 50 per cent. on the entire seed. Larger seeds as a rule contain more oil than smaller seeds. Two samples from Nairobi (British East Africa) were examined, and the larger form yielded 47·35 and the smaller 43·35 per cent. of oil by extraction. Dubard and Eberhardt obtained average of 46·19 per cent. with East Indian castor seeds and by the ordinary crushing and heating with water about 37·4 per cent. of oil. Modern European machinery, especially in the jails and on the railways, is now largly used for crushing the seeds. The castor oil mills of Calcutta use up to an average of 700,000 cwts. of seed, drawn mainly by the railways from Bengal and from the United Provinces.

Castor oil is a colourless or pale greenish oil having a taste at first mild, then harsh. The oil is very viscous, but does not dry even when exposed in their layers. Most commercial samples contain only very small proportions of free fatty acids ; this is due to the refining process which consists in the coagulation of albuminous matters by steaming and then removing them by filtration. Castor oil is strongly dextro-rotatory. Deering and Redwood examined twenty-three samples of Indian oil and observed that in a 200 mm. tube in a Hoffmann-Laurent polarimeter the variation was from + 7·6° to + 9·7°. Castor oil may be said to consist of a small quantity of tristearin, of the glyceride of dihydoxyetearis acid, and to a large extent of the glyceride of ricinoleic acid.

The physical and chemical constants of the oil have been found as follows : Specific gravity at 15.5 , 0·963 to 0·964 ; saponification value, 177 to 184 ; iodine value, 81·4 to 85·3 ; Reichert-Meissl value, 1·1 ; Maumené test, 46-47 ; oleo-refractometer degrees at 22 , 41 to 42·5. Insoluble fatty acids : Melting point, 13° ; iodine value, 86 to 88.

The high specific gravity and acetyl value and its very high viscosity afford ready means of identification. It is also miscible in all proportions with glacial acetic acid and absolute alcohol, but is nearly insoluble in large quantities of petroleum ether, kerosene and higher boiling paraffin

oils. The price of castor oil is at present so low that adulteration with fatty oils is seldom practised. The price is Rs. 10 to Rs. 16 (13*s*. 4*d*.—21*s*. 4*d*. per maund (82 2/7 lbs.) for lubricating oil, and Rs. 24 to Rs. 27 (32*s*. 0*d*.—36*s*. 0*d*.) per maund for medicinal oil.

Castor oil is valuable as a preservative and is used for leather goods of all kinds and as a lubricant for machinery. It is frequently employed by Indian dyers as an auxiliary in certain tinctorial operations and by calico printers. Turkey red oil is manufactured from it, and is used in mordanting alizarin dyed fabrics and for dressing tanned leather. Medicinally the oil holds an important position as a purgative. Lastly, castor oil is rich in nitrogen and phosphoric acid and is in much demand as a manure for potato and sugar-cane.

Croton Oil

(*Croton Tiglium.*)

This tree is indigenous in Southern India and is cultivated in Southern Asia and China. The seeds contain 53—56 per cent. of oil, known in commerce and medicine as croton oil.

The oil has an amber-yellow, orange or brown colour, according to its age, a nauseous odour, a burning taste, and is a very powerful purgative. It is partly soluble in absolute alcohol and entirely so in petroleum ether. It has weak drying powers and thickens somewhat on exposure to air, and is strongly dextro-rotatory. Croton oil is stated to contain the following fatty acids: Stearic, palmitic, myristic, lauric, valeric, butyric, acetic, formic, oleic, linolic and tiglic. Its purgative principle, according to Dunstan and Boole (1895), is a neutral resinous substance possessing a strong vesicating action.

The constants of the oil are: Specific gravity at 15°, ·937 to ·943; solidifying point −7°; acid value, 7·9 to 30·9; saponification value, 192 to 215; iodine value, 101·7 to 109·1; Reichert-Meissl value, 12·1 to 14·4; oleo-refractometer degrees at 22° + 35°; insoluble acids and unsaponifiable, 88·9 to 89·1; solidifying point, 18° to 19°; unsaponifiable; ·55 per cent.; neutralisation value 201.

Croton oil if adulterated with castor oil can be recognised by its higher specific gravity and lower iodine value. It should yield no solid product with the elaidin test.

REPORT ON INSECT PEST OF ADIANTUM FERNS.

The insect is a "Scale-Bug"—*Lecanium Hemisphæricum*, Sign.—a very common pest of ferns and pot plants, all over the world.

Treatment.—Spray (or syringe) with "Vermisapon" 1 lb. to 40 gallons water,

Note.—The application to be made in the evening: to be followed next morning, by syringing with clean water.

This will kill the young active insects. The old brown scales are already dead, but shelter numerous eggs which will hatch out later. These old scales will remain attached to the plant for some time, so that the benefit of the treatment will not be immediately apparent.

It is advisable to repeat the treatment after an interval of 10 days and—possibly—for a third time, to kill the fresh broods that will be hatching out. So long as the eggs remain beneath the sheltering scale, it is impossible to reach them with the insecticide.

E. ERNEST GREEN,
Government Entomologist,
R. B. G. Peradeniya, 18t January, 1913.

MEDICINAL AND OTHER PROPERTIES OF THE PAPAW.

The milky juice of the unripe fruit of the Papaw Tree is admitted by high medical authorities to be an efficient vermifuge, and a similar property is possessed by the seeds, which have a pleasant flavour resembling that of cress. The juice is also a good cosmetic, which is used for the removal of freckles. But the most remarkable thing connected with the Papaw Tree is property possessed by the milky juice of the unripe fruit of separating the fibres of flesh and making it tender. The late L. A. Bernays, who was undoubtedly a reliable authority on the properties of plants and fruits, says, in his valuable work on "The Cultural Industries of Queensland," that this property is not confined to the juice of the fruit, but the very exhalations of the tree are said to possess it; and of this fact the Brazilian butchers take advantage to make their toughest meat saleable. This is accomplished by suspending the newly-killed meat in the tree, or by wrapping it in the leaves. So powerful is this softening action of the juice that it must be used with caution, the meat will drop to pieces, which makes it more unpalatable than if left in its original condition of toughness.

Some interesting experiments were made some years ago upon this subject at the Royal Agricultural Museum, Berlin. A portion of the juice was dissolved in three times its weight of water, and this was placed with 15 lb. of quite fresh, lean beef in one piece in distilled water, and boiled for 5 minutes. Below the boiling point, the meat fell into several pieces, and at the close of the experiment it had separated into coarse shreds. The juice can be dried without losing its effect, but its efficiency in this respect does not appear to have been tested over a longer period than six months. For roasting or baking, the best method is to wrap the meat in some of the leaves; and for boiling, to add to the water some of the expressed juice or a piece of unripe fruit. The exact proportion to be used, and the time to be employed to render meat tender without softening it too much, can only be learned by experience; but in a hot country, where meat is necessarily cooked so soon after killing, a method by which it may with certainty be served tender, without detriment to its flavour or wholesomeness, is worth taking some trouble to determine. There can be no doubt concerning this property of the papaw juice and leaves, for we have frequently rubbed tough beefsteak with the milk of the unripe fruit with the result that the meat could be pulled to pieces with a fork on the following morning. The milk has a remarkable effect in eradicating corns and warts. A decoction of the leaves is a wholesome medicine in internal fevers. The dried leaves mixed and smoked with tobacco, or alone afford great relief in cases of asthma. For dysentery the ripe fruit is a sovereign remedy.

RUBBER STATISTICS.

The India Rubber Market Report for the year 1912 of Gow, Wilson & Stanton, Ltd., has just been issued. It will be seen from the following tables that the Plantation Rubber Industry has made remarkable progress during the past year.

Table I.

EXPORTS OF PLANTATION RUBBER FROM MALAYA AND CEYLON SINCE 1905.

Year.	Port Swettenham Tons.	Singapore and Penang Tons.	Ceylon Tons.	Total Tons.
1905 ...	—	130	75	205
1906 ...	327	385	146	531
1907 ...	649	885	248	1,133
1908 ...	919¾	1,639	371¼	2,010¼
1909 ...	1,321½	2,010	666¼	3,997
1910 ...	3,482	2,574	1,465	7,521
1911 ...	5,406	5,373	3,194	13,973
1912 ...	*13,850	*5,243	†5,395	‡24,488

* Exports up to 1st December. † Exports up to 25th November. ‡ To end November.

Table II.

HIGHEST AND LOWEST PUBLIC SALE AVERAGES, 1906 TO 1912.

	1906	1907	1908	1909	1910	1911	1912
Quantity sold (in Tons) ...	348	814	1,925	2,684	5,193	9,699	17,657
Lowest and Highest Average during each year ...	4/9 to 6/0½	3/1¾ to 5/6⅞	2/10½ to 8/5	4/11½ to 8/5	5/ to 11/11½	4/2¼ to 7/2	4/- to 5/6¼
Range of Fluctuation...	1/3½	2/5⅛	2/7½	3/5½	6/11½	2/11¾	1/6

Table III.

QUANTITY AND AVERAGE PRICE OF PLANTATION RUBBER OFFERED AT AUCTION IN LONDON DURING THE LAST SEVEN YEARS.

1st Jan. to 31st Dec.	No. of Pkgs. offered.	Quantity in Tons. Ceylon.	Malaya.	Total.	No. of Pkgs. sold.	Average price paid.
1906 ...	6,462	98¼	250¼	348½	4,130	5/6¼
1907 ...	15,380	192½	621½	814	7,388	4/9⅜
1908 ...	24,647	290	1,005½	1,925½	16,018	4/1¾
1909 ...	50,602	432	2,252	2,684	40,877	6/7⅜
1910 ...	95,394	761¼	4,432¼	5,193½	85,438	7/7¾
1911 ...	177,195	1,622	8,077	9,699	163,403	5/0⅝
1912 ...	316,431	3,150	14,507	17,657	297,897	4/7½

Crepe and smoked sheet still form the two principal descriptions manufactured. In the earlier part of the year the former was in most request and on the average realised the best prices; but, partly owing to the comparative shortage of first quality smoked sheet, this kind has since come into very strong demand, realising a premium over all other sorts.

A very large proportion of the whole crop is shipped in the form of crepe, but as the premium lately ruling on smoked sheet will inevitably

Further, it is well-known that when land is newly brought under wet cultivation, it very often yields well. After a time, however, it begins to appear alkaline and the yield falls. This goes on until the land becomes so alkaline that the crops fail altogether and cultivation has to be abandoned. In such cases it is usually noticed that while care has been taken to arrange proper means of irrigation very little or no attention has been paid to the facilities for drainage and in consequence this unfertile condition has resulted. These are a few of the disadvantages of defective drainage; it will be noted that they tend to diminution of yield, even to total loss of the crop and to waste of water.

Where irrigation is done by means of furrows, these should be straight, of uniform slope and should lead into a drain of slightly greater depth, and care should be taken that this drain is kept free, otherwise water will stagnate in the furrows.

ROYAL BOTANIC GARDENS.

Visitors to the Royal Botanic Gardens at Peradeniya for the month of January 1913 numbered 2,425.

OUTPUT OF PLANTATION RUBBER.

Ceylon Acreage and Yield.

The figures of Ceylon acreage and yield are as follows :—

Year.		Acres.		Tons.
1902	...	4,500	...	—
1903	...	7,500	...	19
1904	...	25,000	...	34
1905	...	40,000	...	75
1906	...	100,000	...	147
1907	...	150,000	...	248
1908	...	170,000	...	407
1909	...	174,000	...	666
1910	...	188,000	...	1,472
1911	...	220,000	...	2,800
1912	...	230,000	...	5,000

Acreage and Yield in Malaya.

The figures are mainly taken from Wright's Para Rubber, 4th edition, with the exception of those for 1911 and 1912 which have been estimated :—

Year.		Acres.		Tons.
1902	...	7,500	...	—
1906	...	99,230	...	425
1907	...	179,227	...	1,036
1908	...	241,138	...	1,655
1909	...	292,035	...	3,064
1910	...	362,853	...	6,531
1911	...	420,000	...	12,000
1912	...	450,000	...	20,000

—*The India-Rubber Journal of January 4, 1913.*

PADDY CULTIVATION IN CEYLON DURING THE XIXTH CENTURY.

BY E. ELLIOTT.

(*Continued from page 238, Vol. XXXIX, No. 3.*)

Quanta Costa.

As already stated, out of the addition of 6½ millions of bushels in the Island's production of paddy, 3½ (or over half) is directly due to irrigation. In treating of the cost of this favourable result, it is necessary to discriminate between the outlay on the works which have been instrumental in securing it and the expenditure on the Giants' Tank and on the large schemes undertaken as part of the programme evolved by Sir West Ridgeway, which led to the "development of an efficient establishment" and culminated in the creation of a distinct Irrigation Department in 1900.

With this object I have, from the very full details given in the report of the first Director (Mr. H. T. S. Ward), been able to prepare a statement showing separately :—

(*a*) The outlay on construction and maintenance of works undertaken prior to 1898.

(*b*) Further outlay in additions and improvements (under both heads) to the same works between 1899 and 1906.

(*c*) The expenditure since 1898 on the large works (including the Giants'* Tank) which had not affected cultivation up to 1907.

The exact figures are as follows :—

	On the older works. Prior to 1898.	Between 1899-06.	On the newer works.	Total.
	Rs.	Rs.	Rs.	Rs.
On construction ...	6,139,326	298,758	3,156,823	9,594,907
„ Maintenance, Repairs and Village Works ...	1,014,063	633,361	55,488	1,702,912
	7,153,389	932,119	3,212,311	11,297,819
Establishment ...	709,756	93,211	1,512,899	2,315,866
Surveys	...	...	156,868	156,868
Miscellaneous, Tools, etc.	...	...	179,239	179,239
Interest on loan† ...	...	...	195,811	195,811
Total ...	7,863,145	1,025,330	5,257,128	14,145,603

According to Keane's figures in Sessional Paper XLV of 1905 the expenditure from 1870 to 1904 was Rs. 12,555,804; while in Ferguson's Directory (1906-07 edition) it is stated to have been Rs. 12,450,196 between 1867 and 1905.

Adding to these figures the outlay in Sir H. Ward's time (Rs. 445,344) and the subsequent disbursements (as given by the Director) till end of

*Though the water was sent down the supply channel as early as 1902, apparently for want of facilities for distribution the addition to the crops in the Mannar district up to 1906 did not exceed Rs. 20,000 above what it was in 1888-92.

†The expenditure charged to the loan was Rs. 1,700,000; the rest being met from the apportionment from General Revenue.

must be clearly stated and definitely understood. It may be for the purchase of a plough or other implement, the purchase of a horse, cow, pig, or what not, or the erection of shed or cow-house. The purpose must be reproductive. No loan is granted unless there is a reasonable assurance that the money will produce profit and make repayment easy. These things are distinctly laid down in the rules. The loans are always for a fixed time, though its length may vary to any extent according to the needs of the applicant, and the time of the year. The business is managed by a Committee, elected by the members, which gives its services free, but receives out-of-pocket expenses. In the form of bank which is usually adopted in rural districts, there are no shares, and therefore no dividends. A credit bank is not a profit-making institution, but a co-operative scheme for providing certain benefits for its own members. Its object is to enable them to make a profit on their individual transactions.

The security for the loans is ample. It consists, first of all, in the personal knowledge of the applicant, possessed by the Committee; secondly, in the requirement of two sureties, themselves also personally known to the Committee; and thirdly, in the unlimited liability of every member. This is the corner stone of the system. Each member is individually liable for the repayment of the debts of the bank. It may easily be imagined what powerful pressure is brought to bear on any member who fails to repay his loan. In fact, he is ashamed even to appear in the village street! Every day he is in arrear means some degree of injury to, perhaps, a score of his neighbours. Special pressure, so often used for unworthy purposes, operates here most usefully. It is reinforced by the fact that the members are all equal, and that any defaulter is recognised as playing false to his mates, The results are marvellous. The Agricultural Banks Association of Germany, embracing more than 3,000 societies, reports that neither member nor creditor has lost a farthing by them since the establishment of the movement in 1849.

I have left till the last the question of the deposits, says Mr. Buxton. The very smallest sums are welcomed. The true idea of a credit bank is that the people of a locality, instead of putting their savings into savings banks or other institutions which will send the money away to the great centres, invest it locally. There is, indeed, a strong inducement to them to do so, in the fact that the bank is administered by local people whom they know; in addition to which, they have the satisfaction of knowing that the money is being used to help and fructify their own district. This side of the businsss needs very careful consideration. It is clear that the local use of the money is a very considerable inducement to many small investors. On the other hand, if the investment is to be on really good security, it ought to be guaranteed by a strong central institution with the credit of the State behind it. There is much to be said for the view that deposits should be received through the post offices and paid into a Central Agricultural Bank, while being at the same time earmarked for the particular localities from which they come. Such a Central Bank has the further advantage that it can establish a balance between one local bank which has a superfluity of deposits, and another which has not enough.

In practice a Credit Bank is often put on its legs at the outset by one or two loans from wealthy people in the district. Three, four or five per cent. is paid on loans, and the money is lent to members at 5 or 6 per cent. In Ireland, where the Credit Banks number between 200 and 300, the Department of Agriculture has lent to them some £17,000 at 3 or 4 per cent.;

they have thus been enabled to lend to their members at the popular rate of 1*d.* per pound per month.

The kernel of the Credit Bank question is that personal character constitutes a security at least as valuable as property, but that without some kind of organisation this security cannot be made effective for borrowing money. It is the function of the Credit Banks to provide this organisation. The ingenious notion of a few German reformers has brought a new social force into beneficent play. The Credit Bank is the "capitalisation of honesty." It has a marked educational effect, encouraging the sense of responsibility in the members, teaching them the value of thrift and the spirit of combination.

The system has attained wide dimensions in Germany, Belgium, Austria, France and Italy. It is beginning to flourish in India. It has been introduced, as I have shown, into Ireland. In England its growth has been extremely slow, but it has been steady. In 1908 there were 20 Credit Banks affiliated to the Agricultural Organisation Society, in 1908, 29; in 1910, 35; and at the present time there are 42. Several of these were formed at the same time as, and side by side with, small holdings or allotments societies.

As in all new movements, there are dangers and difficulties to be faced. One of the dangers to be guarded against is that the proposed new Credit Banks may be perverted to other uses than those for which they were intended. There is now a considerable demand on the part of large farmers for State aid in purchasing their holdings. I am not arguing against such assistance, but care should be taken that the Credit Banks are not employed for this purpose, to the detriment of the small man whom they are intended to help.

Among the difficulties must be counted the probable opposition of the joint-stock banks. If the Government can find some way of working through them and enlisting their co-operation, so much the better; but we must beware that they do not, while undertaking to nurse the infant, quietly starve it. The great banks have really little to fear. The effect of the Credit Bank System is to create new business among people who have hitherto made no use of banking facilities at all. This new business will act as a feeder to the larger business of the established institutions. Bankers in Ireland at first doubted this, but are now beginning to admit it freely. Still it cannot be expected that English bankers will take this view at once. They have heard little of Credit Banks before, and these appear to them in the matter of receiving deposits, at any rate, as possible competitors.

And lastly we have the difficulties which arise among the very people whom we want to assist. New ideas take root slowly. Country people find it hard to combine—much harder than do the townsmen. Some active spirit is needed to start the bank and keep it going; and too often he is not to be found. In many places, owing to the mixture of large and small holdings in England, there are not enough small men living close together to create the conditions under which alone, as I have described above, a Credit Bank can flourish. Some are frightened by the liabilities they must incur—though in practice these are but nominal. Others are alarmed at the idea of revealing their exact financial position to a committee of their neighbours, But difficulties such as these are not insuperable. They are made to be overcome and they can be overcome. The system is growing from year to year, and only needs a little judicious encouragement from above to make a vast difference to the prosperity of our English small holders.

HOW TO MAKE A SCHOOL GARDEN.

The following interesting article contributed by Mr. C. A. Barber to to the "Madras Agricultural Calendar," is reproduced in *The Journal of the Board of Agriculture of British Guiana.* Every elementary school should have its garden. It is of course important for children to learn to read and write and to do simple sums, but other things are necessary to equip them for life, especially in those cases where the mass of the population is devoted to agriculture. They must be taught to observe; not only to see things but to understand what they see. The school garden, if properly managed is one of the best means of training children in this way. There is yet another way in which the school garden may be useful. If the children are taught to do work themselves, they will be taught to do things, not merely to know how to do them. The school garden, then, may be used to train children in observing, in reasoning, and in the capacity for doing things for themselves, all very important matters in after life. They can also be taught to be neat and methodical by making them keep the place neat and tidy.

The main line of work should be to learn all about the way plants grow. Plants should be reared and examined at all stages from the bursting seed to the flowering and fruiting stages. The sowing of seeds in pans should be taught, with the necessary protection against the sun, wind and rain. The seedlings when very tiny should be pricked out into smooth beds so as to leave just room for them to expand and make a few leaves. Then they should be lifted, each with a ball of earth around its roots, and put into the place for which they are intended. Beds should be formed with good gravelled paths between. The beds should not be too wide; every plant should be easily reached from a path, because all treading on the beds should be carefully avoided. Flowers want a good deal of sun, but foliage plants will require some sort of shade. Shrubs should be planted round the outer part of the garden or here and there in the middle if there is plenty of room. Trees should be kept outside as much as possible, for their roots interfere with the beds. By this means you will have the brightly coloured flowers in the middle open space, foliage plants nearer the edges, and shrubs and trees forming the back ground. If possible a small patch of grass lawn should be added to set off the flowers, but it must be kept free from all weeds.

A careful plan of the garden must be made showing all its paths and beds, and this should be filled up with the plants growing in it every season. The children should be made to take part in every kind of planting. They should be taught to weed the beds and keep the paths clean. All weeds and leaves, loppings from the trees and garden rubbish should be put into a pit in a hidden corner with a layer of earth spread over every now and then. This weed pit is a most useful adjunct to a garden and when the weeds are well rotted and their seeds destroyed, the leaf-mould obtained from it may be useful for potting plants or in improving the soil.

Photo by H. F. Macmillan.

IPOMÆA LEARII.

A Beautiful Moonflower Climber, with large deep Blue Flowers.

As great a variety of plants as possible should be aimed at; for each will show something of interest and the children will learn something of the infinite variety in Nature. The teacher will find it much easier, where there are many kinds of plants growing to select just those for class work which are suited to the lesson of the day. By a well arranged school garden every part of a plant's life may be illustrated, the use of each organ, the causes of health and disease, animal and vegetable pests (which will always be present), the effect of the sun and light, wind and shade, watering and drought.

DATE PALM SUCKERS.

A Consignment from Egypt.

On November 31st last an application was made to the Principal, School of Agriculture, Ghizeh, for 10 suckers each of the following varieties of the Date palm :—Siwi, Birkawi or Hayani, Amhat, and Sultani, the same as were imported in 1906, and to which reference has been made in the issue of the *Tropical Agriculturist* for November last.

The Director-General of the Department of Agriculture, writing on the 31st December, advised the despatch of the suckers, and stated that he had sent moderately large plants as small ones did not support a long voyage.

The plants duly arrived by the "Scharnhorst" on January 23rd, carefully packed in 7 cases, were received in excellent condition and sent immediately to Peradeniya. They have been planted in likely places, *e.g.*, Jaffna, Batticaloa, Hambantota, Puttalam, Mannar, Anuradhapura and Kurunegala Districts.

LARGEST MAIZE FARM IN THE WORLD.

An interesting description of the largest maize farm in the world, owned by the Rankin family, is given by the American "Country Gentleman." The late Mr. David Rankin paid the last one pound note he possessed to the minister who married him in 1850, and 50 years later his income ran into millions, all earned by farming, while 39,900 acres of land in Missouri, gradually accumulated by him, are now owned by his family. At the time when the system of steadily exhausting virgin soils was all but universal, Mr. Rankin kept up the fertility of his land by selling all his maize "on the hoof," although towards the end of his life he was growing 14,000 to 20,000 acres of that grain. After raising four or five maize crops the fields were sown with timothy and clover, to be grazed by cattle and pigs. About 1,000 working horses and mules, 10,000 steers and 25,000 pigs are kept on the set of farms, and an illustration is given of forty-two-row cultivators at work in a maize field of 6,000 acres. During the summer and autumn the cattle graze on the blue grass, timothy, and clover, while they are wintered on ensilage, maize fodder, and maize in the ear or shelled. The pigs follow the cattle, but are fed on maize in the ear at night, at least in cold weather.—*The Producers' Review.*

THE DANGER OF INFECTION FROM TUBERCULOUS MILK.

Medical men and veterinarians have for many years been in accord in urging the necessity for the adoption of strong measures to keep in check, and eventually get rid of, the plague of tuberculosis; and a paper read by Dr. Sheridan Delépine a short time ago, at the conference of the National Association for the prevention of Consumption can well be brought to the notice of our readers in the same column as the recently issued report (for 1911) of the veterinary surgeon to the Corporation of Glasgow. Dr. Delépine took as the title of his paper "The Share taken by Human and Bovine Tuberculous Products in the infection of Young Children," and his final statement demonstrates very emphatically the necessity for the systematic and proper inspection of dairy cattle, for he states at the conclusion of his paper, "Taking all these things into consideration, I think it is possible to say, without fear of exaggeration, that not less than 25 per cent. of the tuberculous children under 5 years of age suffer from infection of bovine origin, and that this estimate is much lower than one based on probabilities would be." Earlier in his paper we read the gratifying statement that "as a result of the work done in Manchester during the last fourteen years the amount of tuberculous milk supplied to the town has been reduced to about one-third of what it was originally, and its infectivity has also been reduced to a very considerable degree." This statement is a great tribute to the work done by Dr. J. Niven and his veterinary officials, and the example of the Manchester Corporation in this direction might with advantage be followed by other cities, if parliament is still going to delay some form of general legislation on milk questions, and leave municipalities to use what local powers they can obtain in various manners. The extensive prevalence of tuberculosis in cattle and in that other animal, the pig, which feeds so largely during a certain portion of its life upon milk, is constantly brought into prominence by abattoir statistics, and those of Glasgow carefully compiled in the veterinary report of Mr. Trotter, shows no exception to the rule. Mr. Trotter commences his report by the statement that "The most frequent disease affecting home animals is tuberculosis," and states that out of 71,745 British cattle slaughtered no less than 8,932, or 12·44 per cent, proved to be tuberculous. Of these, 1,398, or 15 65 per cent. of the carcases were so badly affected that they had to be destroyed. Of the pigs, out of 44,643 animals slaughtered 3,740, or 8·37 per cent. were tuberculous, 91 or 2·43 per cent. of the carcases having to be totally destroyed. He calls attention to the crying necessity for enforced legislation in connection with the inspection of dairy cows and the sale of milk, and states that a comparison of the number of cows in Scotland with the number of cows removed under the Order shows that, whilst a few authorities are doing their utmost to prevent the sale of milk drawn from animals affected with tuberculosis of the udder, there are a great many other authorities who are doing absolutely nothing. He points out how defective the "milk" clauses of the Burgh Police Act are in that they "do not compel the dairyman to notify all cases of udder disease, do not insist upon the examination of all cows being carried out by veterinary surgeons, and do not empower the local authority to slaughter useless animals." Of the prevalence of

tuberculosis amongst milch cattle, further evidence was shown by the fact that of ninety-eight cows tested with tuberculin before being admitted to the herds from which milk is supplied to the fever hospitals no less than forty were rejected, thirty of them being positive and the other ten doubtful reactions—truly an alarming proportion when we consider that these would all be good-looking beasts which had received the critical attention of the dairy owner beforehand in the full knowledge that they were to be tested. The danger is not, of course, that all the reacting animals give infective milk, but that such a degree of prevalence of tuberculosis must mean the presence of a high proportion of dangerously infected animals in our herds. It is now five years since the Commission on Tuberculosis reported that "cows milk containing bovine tubercle bacilli is clearly a cause of tuberculosis, and of fatal tuberculosis, in man.' Neither the Board of Agriculture nor the Local Government Board have been sufficiently active in the matter, but we note with pleasure that Mr. John Burns has given notice of the introduction of a new Milk Bill into the House of Commons.—*The Lancet.*

THE DISTRIBUTION AND ACTIVITIES OF BACTERIA IN SOILS OF DRY REGIONS.

The *University of California Publications in Agricultural Sciences* contains an interesting paper read by Mr. Charles B. Lipman before the Society of American Bacteriologists, Washington, on December 27, 1911. Mr. Lipman in concluding his paper observes that investigations of the distribution and activities of bacteria in soils of the arid region show:—

1. That samples of soil for studying the flora of each layer of soil can best be obtained from a hole twelve feet in depth with at least one vertical wall, the latter when sterilized being sampled.

2. That tin tubes ten inches long and about one inch in diameter closed at one end and cotton-stoppered are best for collecting the samples.

3. That the solution method for studying the soils, despite its many drawbacks, is the most feasible one to employ.

4. That soils of the arid region at all depths studied show ammonifying powers which, howver, are generally most vigorous in the first six or eight feet. In one case ammonification was noted in soil from a depth of fifteen feet, or adjoining the water-table.

5. That nitrification is found commonly down to a depth of five to six feet in soils of the arid region. In one case soil from the eight-foot depth showed a vigorous nitrifying power.

6. That nitrogen fixation through Azotobacter does not go on below two feet in the soil usually, but has been found in some soils at three feet and in one soil down to four feet. Many soils in the arid region, otherwise favourably constituted, do not contain Azotobacter organisms.

7. That from the point of view of ammonification and nitrification soils in the arid region differ markedly from those in the humid region when the lower layers of soil are considered. The difference is not marked as regards nitrogen fixation.

8. The results above recorded help to explain the favourable physical and chemical constitution of our soil and also the deep rooting of plants so characteristic of the arid regions.

SOME RESULTS IN FALLOWING LAND.

The Producers' Review of November 20, 1912, publishes the following interesting article by John W. Paterson, B. Sc., Ph. D., Experimentalist, and P. R. Scott, Chemist for Agriculture, Victoria. The most pressing demands of an ordinary crop are for water, phosphates and nitrates. The importance of these arises from their comparative scarcity in the soil. The deficiency of phosphates is most easily made good by applying some phosphate manure along with the seed. The deficiency of water and nitrates can usually best be remedied by some system of fallowing the land.

Fallowing and Soil Moisture.

Table I. gives the percentage of water in the top 18 inches of soil at each date of sampling. The results are calculated on the dry soil.

Table I.

		Worked Fallow. Per cent.	Neglected Fallow. Per cent.	Oat Crop Per cent.
October 16	...	27·22	24·27	24·95
November 28	...	19·62	15·95	16·25
January 17	...	0·66	11·61	10·01
February	...	21·67	12·38	10.06

In viewing the results the conditions regulating the loss of water on good fallow, bad fallow and on crop may be briefly recapitulated. Water rises in a moist soil somewhat rapidly by capillarity. In a good fallow, the upper layer of soil is kept loose and dry by cultivation, so that its capillary power is lost. This loose, dry layer protects the water within the capillary zone underneath from sun and wind. In a bad fallow, the surface is compact, and also damper, so that capillary action is continued right through to the top, which is unprotected from drying influences. A crop requires much water for its growth, which must come from the soil. Experiments bearing upon the water losses through plants were previously reported.

The Results by Weight.

By weighing the earth from a measured hole, it was estimated that 1 acre of the soil to a depth of 18 inches equalled 2,270 tons in the dry condition. Employing this figure, the water percentages at the different dates may be converted into tons.

Table II.

		Worked Fallow Tons	Neglected Fallow Tons	Oat Crop Tons
October 16	...	572	551	566
November 28	...	445	362	345
January 17	...	469	203	227
February 28	...	492	281	228

At the close of the exeriments, the cropped soil contained 264 tons, and the neglected fallow 211 tons less of water per acre in the first 18 inches than the corresponding worked fallow. One ton of water to the acre equals almost exactly one pint of rain.

Relation of Fallowing to Nitrates.

Leaving the effect of fallowing upon moistures, the nitrate contents of the plots next call for notice. Table III states the results obtained in

lbs. per acre of nitrate nitrogen for each plot at the different dates of sampling. Depth, 18 inches.

Table III.

			Worked Fallow lbs.	Neglected Fallow lbs.	Oat Crop lbs.
October	16	...	14·04	17·58	trace
November	28	...	43·20	44·36	3.31
January	17	...	113·09	60·29	28·06
February	28	...	148·91	58·63	32·49

Up to 16th October, the worked and the neglected fallow had received the same treatment, and the results show that the worked fallow had no original advantage. Nevertheless, at the end of February, the neglected fallow contained just 39 per cent. of the nitrate present in the worked plot. The latter was seen to be much moister during the latter half of the experiments, and the extra nitrates are probably due in large measure to this extra moisture encouraging nitrification. This is in accord with the results of experiments recently reported in this journal. Sufficient moisture will be of greatest benefit in aiding nitrification during the hot months of the year. In addition to the extra water present, the better aeration of the worked fallow would also encourage the production of nitrates.

Nitrate Used by Crop.

On the cropped plot the nitrate content was only a trace at the date of the first sampling. Comparing it with the fallow plots, this could not be due to lack of moisture, as at that date the moisture content of each plot was approximately identical. It appears that the nitrates of this plot had been absorbed to supply the wants of the growing crop. Apparently the crop in the early part of its growth was taking all the nitrates it could find. This fact indicates the importance of nitrates in the soil, and the probability that the supply often fails to meet the demand.

Summary.

1. A well-worked fallow prevents much loss of soil-moisture during dry weather.

2. A fallow may do little good if neglected.

3. A crop leaves the soil extremely dry in the autumn.

4. This lack of moisture must affect the succeeding crop unless the winter be exceptionally wet.

5. The Australian climate indicates in a special degree the need for fallowing.

6. Land growing a crop may contain only a trace of nitrates.

7. This deficiency may starve a crop.

8. Nitrate formation stops when the surface soil becomes too dry.

9. A growing crop dries up the surface soil.

10. It is desirable, therefore, that a crop should start with a ready formed nitrate supply in the soil and subsoil.

11. Such a nitrate supply will also favour a downward development of the roots.

12. A well-worked fallow meets the nitrate requirement of the succeeding crop.

13. Fallowing serves the double purpose of storing soil-moisture and supplying nitrates.

TACKINESS IN FUNTUMIA.

Still utilizing the report on the rubber tapping in Benin City Communal Plantations in 1910—issused by the Southern Nigerian Government as Paper No. 5 of 1912—we will now discuss the question of coagulating Funtumia, says *Tropical Life*.

In the case of the communal rubber tapped and prepared by the natives under the immediate supervision of the English officials, the coagulation was done by boiling, as it was thought unwise to introduce acids or chemicals of any description for the purpose, and also because in boiling, they had a method that could easily be imitated and carried out by the natives. Without care or knowledge, however, boiling incurs a considerable loss by burning, as much as 50 per cent. being spoiled. About 1½ pints of water to ¼ pint of latex was used, the water being brought to boiling point before the latex was put in. If too little was used the rubber ran the risk of getting burnt, if too much and it overflowed, then the rubber was wasted. It was found that latex just taken from the trees could not be cooked, or, let us say, coagulated satisfactorily. If the latex is allowed to stand for twelve hours, the water is cleared without excessive cooking, the rubber is in a pliant state capable of easy rolling, and there is no waste. The rubber having been coagulated is then placed on a table and rolled out. After coagulation by boiling and being rolled out, the rubber was washed, and then placed in the specially-built shed to dry. This was a building 54 feet long by 20 feet wide, constructed of squared timber and corrugated iron, the sides being open for ventilation. Inside were a series of wire netting shelves, on which to lay the rubber. But the rubber took from four to six months to dry, although small fires were kept going in the shed most of the time as the wet season was on, and yet, in spite of all this, another 2·5 per cent. was lost in weight between the time the rubber was shipped and it sold in London. Mr. Foster then adds an interesting paragraph, reporting the results of his investigations as to the cause of tackiness. "I suspected that light or heat was the disturbing factor. I then made various experiments with biscuits, subjecting some of them to excessive heat and some to strong light, and found that whilst heat alone had no effect, strong light and heat combined produced tackiness at once. As I was unable to separate light from heat I am unable to say whether light alone would do it, but I, at any rate, established two facts: (1) That heat alone would not make rubber tacky, whilst a combination of heat and light would; (2) That it was only on the outside of the shed where rubber was exposed to the morning or afternoon sun that tackiness occurred. This, of course, would have been noticed before had it not been for the fact that the biscuits were constantly turned to accelerate drying, and in doing so, their position was altered. After this I erected palm-leaf shades on either side of the shed, and since then there has been no tacky rubber."

Samples of the rubber were submitted to Mr. W. Ralston, B. Sc. Lond. F.I.C., the Government Analyst and Chemist, whose report dated Lagos, August 31st, 1911, ran as follows:—

"Six samples of rubber showed the undermentioned percentages:—

Sample No.	232	233	234	235	236	237
Moisture ...	·65	·93	·73	·91	·79	·77
Ash ...	·81	·54	·49	·55	·5	·47
Resinous matter...	8·62	9·87	8·0	8·17	8·85	8·45
Caoutchouc ...	89·92	88·66	90·78	90·36	89·86	90·31

"The rubber seems to be of good quality."

AGRICULTURE IN PORTO RICO.

The annual report of the Agricultural Experiment Station of Porto Rico has just been issued and contains many items of interest to the residents in the Philippines considering the situation of both these countries.

The trade of Porto Rico has increased from P33,200,000 in 1900 to P157,400,000 in 1911, of which P80,000,000 are exports, all agricultural materials, raw or manufactured. Sugar is the leading export now. Tobacco and cigars to the value of P14,000,000 were exported—other manufactured products were preserved fruits, straw hats and distilled spirits. The advance of Agri-Horticultural Science is shown by the importation of artificial fertilizers to the value of P2,000,000. Steam ploughs are largely utilized on the large sugar estates, and the cable plough is there favoured in preference to the motor truck. Coffee in Porto Rico is a crop of considerable importance but pineapples and citrus fruits are now encroaching upon the coffee.

The growth of the fruit industry in Porto Rico during the last decade is remarkable. From nothing, the fruit export has during this time grown to P3,600,000 during the past fiscal year, yet the fruit orchards are just coming into bearing. Very superior pomelos and oranges are produced and aside from the fresh fruit shipped to the United States several pineapple canneries are in operation there.—*The Philippine Agricultural Review*, December 1912.

GROWING YAMS.

Mr. C. E. Wood, Manager of the Kamerunga State Nursery, Cairns, in one of his last articles published in the journal, introduced the matter of yam-growing, says the *Queensland Agricultural Journal* of January 1913. Yams are an excellent vegetable and will thrive under conditions where the more favoured sweet potato would not do so. Yams require a warm, damp climate to be produced to perfection. They are propagated by sets from the roots, or by small bulbs which are planted in the same manner as seed potatoes. The land is usually lined out in rows 3 feet apart, the sets being planted 3 feet apart in the rows. The best planting season is September and the crop will be ready to take up in from five to eight months, according to the variety planted. They are the better for being moulded up two or three times during growth. In order to induce a proper growth, they are usually planted in comparatively shallow soil, or if such is not procurable then a flat stone or board is laid at some depth below the set. After planting a stout stake is placed near the hole. When the shoots appear they run very rapidly and climb up the pole. The after cultivation is trifling and consists in weeding and loosening the soil; and where poles are used, the cultivator can be run between the rows, and with a Dutch hoe the weeds can be destroyed close up to the plant.

DIGESTION EXPERIMENTS WITH POULTRY.

The Journal of the Board of Agriculture contains the following article which is extracted from the Maine Agricultural Experiment Station Bulletin No. 184. The fact that the digestibility of feeding stuffs in the case of ruminants, horses and pigs had received considerable attention but that few experiments had been made with poultry suggested the investigations described in this bulletin.

The difficulty of carrying out experiments of this nature was considerable owing to the fact that the urine and the solid dung of fowls are excreted together.

Experiments were first undertaken with year-old hens, chiefly with a view to gaining experience as to the best methods to be adopted, and the result of the work done with these birds was not very satisfactory, as they were nervous and lost condition; cockerels proved the most satisfactory subjects for experiment.

Two rooms were set apart for he birds; in one they were kept during the resting period; in the other, cages were provided for their reception. Precautions were taken to arrange for the provision of feeding and drinking dishes which would prevent the food being spilled. The duration of the experiments was 12-14 days, divided into two periods, a preliminary period of 5 to 7 days, when the amount the bird would eat was determined and the alimentary canal freed from other food, and a collection period when the fæces were collected. As it was impossible to tell how much water the birds actually swallowed, no record was kept of the weight of water consumed.

The birds were fed at regular hours and the fæces collected at the same time; at the end of the collection period the fæces were taken to the laboratory, air-dried and submitted to analysis.

The results obtained from these experiments indicated that the digestion co-efficients of most foods for poultry are not materially different from those which obtain in the case of other farm animals, save that, unlike ruminants, poultry digest very little crude fibre.

Maize gave a higher digestibility than any other grain tested. Wheat-bran gave a low digestibility. A mixture of equal parts of maize meal and finely cut early clover was sufficiently bulky to feed with concentrated food, and was more digestible than bran. The results confirm those of other investigators in showing that maize is a most valuable grain for poultry. It cannot be given alone, as it is too concentrated a food, and is deficient in protein, but in combination with foods rich in protein and some bulky material such as cut clover it makes a most desirable ration.

Leghorns in South Australia.

The same Journal has culled the following remarks from the Report of the Poultry Expert, South Australia, for the year 1910-11. The report deals with the general progress of the poultry industry in South Australia during the year ended June 30th, 1911.

Attention is drawn to the increasing tendency of White Leghorns to become broody. Of 61 pens of Leghorns and Minorcas entered in a laying competition only nine pens finished the year without any cases of broodiness.

The result of experiments dealing with the weight of eggs produced by three White Leghorns and three Black Orpingtons during a year is recorded, and the results tend to show that the limits of variation in the weight of different eggs laid by the same hen are considerable; in nearly every instance, after a rest of a day or two, the succeeding egg showed an increase of weight.

FORESTRY.

FORTY YEARS' MANAGEMENT OF WOOD.

The following article from the *Quarterly Journal of Forestry*, October, 1912, is reproduced in the *Journal of the Board of Agriculture*, January, 1913:—

Reliable data as to the pecuniary returns from woods over a period of forty years are supplied in this publication by Mr. D. Tait. The woods in question are on the Owston Park Estate, near Doncaster, and the managment has been carried on by Mr. Tait since 1869. At that date there were 350 acres of enclosed plantations, four-fifths of the woods being at an elevation of 19 tc 35 feet above sea-level, on a clay soil, or in some cases on a peaty soil resting on clay. The woods above 35 feet are on the Magnesian Limestone formation on a good free soil. Since 1869 12 acres have been grubbed out and converted into arable land, and 57 acres have been planted. In 1912 there were 380 acres of enclosed woods.

In 1869 the ages of the woods were from thirty to ninety years. In 60 acres of the younger woods there was a fair sprinkling of the larch, the principal crop being oak, with a small proportion of ash. In the remaining portion there was a fair sprinkling of spruce throughout, but the main crop was oak. On the peaty soil ash was the main crop, but there was also some Scotch fir. In the higher woods there was more of a mixture of hard wood trees, comprising beech, elm, sycamore, oak, ash and various other kinds. On the low land there was also a proportion of alder, birch, poplar, willow, etc.

The gross quantity of timber felled for sale during forty consecutive annual thinnings was 328,743 feet, the average per year being just over 8,200 feet, the average sum received per year being £370. The whole of the woods at the present time are well stocked with trees of various sizes, and taken as a whole, they contain as large a quantity of saleable timber as they did forty years ago.

The average annual cost of labour for keeping up the plantations was £145 or 8s, per acre, This includes the cost of felling timber, and all manual labour such as fencing, ditching, etc., as well as labour in replanting, but does not include the making of plantations on land not formerly planted. The day wages for the men were 3s. 4d. The price for felling plantation grown timber was 2s. 3d. per ton of 40 feet. Horse labour was a considerable item, and averaged £19. 5s. per year, being £17. 5s. for dragging timber to the margin of the woods for sale and £2 for carting, fencing, etc.

PALM OIL AND NATIVE RIGHTS IN WEST AFRICA.

THE LEVER CONCESSION.

The following extract is from a letter by "Africanus" to the *London Times* of January 8, 1913:—

The exploitation of the fruit of the oil palm has been the staple industry of the coastwise region of West Africa from Sierra Leone to the Cameroons for about half a century. It is purely a native industry, and has been built up entirely by native energy and the enterprise of European (mainly British) merchants. The oil (both classes, but especially that extracted from the kernels) is with copra oil, the principal constituent in the manufacture of soap, in which industry Britain holds the world's field. Of recent years chemical processes have succeeded in making palm kernel oil edible, and it now enters into the composition of margerine, nut butters, and other fatty substances. Thus a double home market has been created for the product of the oil palm, the price of the raw material has gone up, and the great soap manufacturers of this country have thought it necessary in the interests of their business to tap the source of production direct for their supplies, and to devise ways and means under which the cost of manufacture can be lowered, by lessening the initial cost of the raw-material and by other methods into which it would be beyond the province of this letter to enter. This means or will mean, the advent of entirely new influences into West Africa, the home of the oil palm, and the concern of every civilised Administration in West Africa must be to so regulate matters that, while mechanical enterprise and invention shall not be discouraged from entering the country, the interests of the native population, wherever trade in these products has been established, shall not suffer thereby.

Lever Brothers took the first step on the new road. They invented machinery for the treatment of the whole fruit (*i.e.* the outer fleshy substance—known as palm oil—in which the nuts are buried, the cracking of the nut and the crushing of the kernel). They applied for and obtained from the Belgian Government an enormous territorial concession in the Upper Congo, where the oil palm abounds, but where no export trade in its produce has been brought into being. A Belgian company was created for the purpose: The terms of the concession confer upon the Company proprietory rights over the palm trees and impose various obligations in return. After a certain lapse of time the company becomes the actual owners of the land itself and sets up a virtual *imperium in imperio.* The natives have the right to collect rubber and copal in the concession for trade purposes, but not the produce of the palm. The company has no rights of coercion over the native population, upon whom it must rely to gather the fruit. The Company erects mills upon the spot to treat the fruit scientifically and ships home the finished product to Europe. It is a great economic experiment, which may or may not succeed. Much can be said for and against this arrangement from the standpoint of native rights and interests. Probably the view which commends itself to the bulk of those who have interested themselves in the fate of the Congo was expressed by M. Emile Vandervelde, the leader of the Belgian Reform Party, in the course of a debate in the Belgian Chamber. Strongly criticizing the basis of principle upon which the concession had been granted, M. Vandervelde went on to give reasons why he could not see his way to oppose an arrangement which would create employment, or to vote against an enterprise established by a captain of industry whose just

treatment of labour in England was universally admitted. But he made it clear that the Belgian Reform Party would narrowly watch the working of the experiment.

Lever Brothers then turned their attention to the British Dependencies. The grant of a similar concession in British West Africa was clearly out of the question, for it would have run counter to all principles of British statecraft in that part of the world. On the other hand, were the Congo experiment successful, it was obvious that a serious competitor to the palm oil and kernel trade of British West Africa would have arisen.

Lever Brothers then applied to the Colonial Office for certain privileges of a minor character. They represented the hardship of putting up expensive experimental machinery in British West Africa without advantages of some kind. They asked that if they erected a mill in a given locality no rival mill-owner should erect another within a distance of ten miles in any direction, and they asked for the exclusive right of laying down traction within the perimeter affected. The demand seemed reasonable. It involved the conferring of no territorial rights, nor proprietory rights over natural products, nor monopoly in the purchase of those products. The natives were free to bring the whole fruit to the mill, or, if it paid them better to do so, to go on preparing the oil and crack the nuts and sell them to the merchants, who on their part were free to buy and sell, within, as without, the perimeter. The privilege asked for, was therefore, in no sense a "concession" as the word has come to be understood. The chief argument in favour of acceding to it was the economic one that if the British West African Dependencies were closed to the advent of this new industry—*i.e.*, the treatment of the fruit of the oil palm on the spot—palm oil and kernels collected and prepared in the old way would be unable to hold their own against the scientifically prepared product which would be competing in the home market from other parts of West Africa. It should be explained that palm oil treated fresh is a much more valuable product than palm oil treated several weeks or months after collection. On the other side the only really valid argument was directed, not indeed against the privilege involving the non-erection of competing mills within a certain area, but against the additional privilege conveying the exclusive right of laying rails inside the perimeter. This, it was feared, would in the long run crush out competition from merchants, thus restricting the area of legitimate trade. The up-shot was that Lever Brothers were granted what they asked in a given spot in the Sierra Leone Protectorate, and legislation was introduced into the Gold Coast Legislature empowering the Governor to grant similar privileges to applicants in that Colony.

THE AGRICULTURAL DEPARTMENT OF MYSORE.

The annual report of this Department (1911-1912) deals with a variety of subjects of local interest. Among these is the green manuring of Ragi (*Elensive Coracana*) the Kurakkan of the Sinhalese, which is such an important "chena" crop. While green manuring is so commonly practised in the North it is unknown in the adjoining North-Central Province where kúrakkan is the main food crop of the people, who if they realised the value of this method of fertilisation would at least have utilised the material so easily obtainable from the surrounding forests. In Mysore it was found that leguminous green manuring raised the yield by as much as 41%, and gave a return of 1845 lbs. or 800 seers of grain per acre. The best of the unmanured plots gave about half this yield.

BACTERIA OF NITRIFICATION AND LUCERNE.

Crops all require nitrogen for their growth. An advantage possessed by lucerne and other leguminous crops is that they are not dependent on the soil for their nitrogen supply, but are able to utilize the free nitrogen of the atmostphere. It is a bacterium present in the soil which enables them to use the atmospheric nitrogen, and in doing this the bacterium forms little wart-like nodules on the roots. These nodules may be seen after digging a plant up. It sometimes happens, however, on land new to lucerne that the necessary bacterium is not present, and then no nodules are formed, and the lucerne becomes dependent on soil nitrogen like any ordinary farm crop. As lucerne requires an excessive amount of nitrogen (probably acquired character), the absence of nodule formation is peculiarly disastrous. In such cases inoculation is necessary to supply the needed bacterium. In the *Hoticultural Gazette* of New South Wales, experiments are quoted from Hawkesbury showing the effect of different methods of inoculation. Tests were made supplying pure diluted cultures of the germ to the seed and soil, and also of sprinkling some soil from an old lucerne paddock on land laid down to lucerne. The results were ascertained by counting the root nodules when the plants were about three months old. Where no inoculation was practised there were no nodules. The best results were obtained by sprinkling soil from an old paddock, 62 per cent. of the plants then showing nodules with a complete manure, and 96 per cent. where 1 ton of lime had been applied. The value of lime to lucerne can be insisted on. American experience also (*Abs. in Science*, 35, (1912) No. 893) gives the preference to soil from old well-inoculated fields rather than to the use of pure cultures which are more uncertain, presumably owing to deterioration in keeping. At Hawkesbury the soil was applied at the rate of 7 tons per acre but although the large application may act more quickly, small dressings of 1 or 2 cwt. will more generally be applied. Such applications cost little, and are very desirable where lucerne is languishing and shows no nodules. The inoculating soil except in dull showery weather, should be harrowed in immediately after application, as strong light will destroy the bacterium.—*The Journal of the Department of Agriculture, Victoria.*

THE GOLD COAST.

An agricultural report from the Gold Coast is of more than ordinary interest to us from the fact that it is now the home of our late Colonial Secretary (now Governor of that Colony) as well as owing to its present Director (Mr. W. S. D. Tudhope) having spent a good while in the Island studying its agriculture before taking up his appointment.

The report discloses a great deal of valuable work, and the results are well classified and arranged.

Under "General Agriculture" we read that a special feature of the year has been the enormous advance in the Cocoa trade. The exports, which in 1911 increased to nearly 90 million lbs. have made the Colony the largest Cocoa-producing country in the world, a fact of no small significance, considering that the industry is entirely a native one, and that the export in 1891 was only 80 lbs.

The other crops which show an increased export are Cola nuts and Guinea grains, while Coconuts bid fair to become an important product.

The planting of rubber is also being undertaken.

WATTLES AND WATTLE BARK.

The following extracts are from an article contributed by Alfred J. Ewart, D.Sc., Ph.D., Professor of Botany and Plant Physiology in the Melbourne University to the *Journal of Agriculture, Victoria*, for January 1913:—

The Forests Department has about 20,000 acres of natural wattle plantations, consisting chiefly of *Acacia mollissima*, "Late Black Wattle." These are mainly in the Victoria Valley, in the Grampians, also on the north side of Victoria Range, the same wattle covers areas of 4,000 acres or more.

The plantations made by the Department include in recent years about 5,000 acres, of which 2,500 are in the Kentbruck district, between Portland and Nelson, on the South Coast. These plantations consist almost wholly of *Acacia pycnantha*, which grows well, but suffers from cold in dry winters wherever the limestone is near to the surface. It has, however, the advantage of not being prone to the attacks of "Fire Blight." These plants are from five to six years old, and the first stripping will take place next year.

At the You Yangs, 14 miles from Geelong, is an old plantation, established first in 1887 by the late Mr. Fergusson, officer in charge of the State Nursery at Macedon. Bluegum and wattle seeds were mixed and sown broadcast. This is a good method of providing a shelter belt, but if the other trees such as gums or pines are too close together, the wattles suffer. On the other hand, since the wattles are sensitive to the winds and frosts, some protection is beneficial to them. In close, warm gullies, however, they are especially apt to suffer from "Fire Blight," the beetles which cause the mischief, breeding especially well under moist warm conditions. For districts within 50 miles of the coast, the best wattle to plant is *A. pycnantha*, with broad, flat leaves or phyllodes, instead of the delicate foliage of the Black and Green wattles. The Golden Wattle will also grow further inland, but becomes too small in size.

The question of costs and profits depends to some extent upon freedom from disease and pests from the ravages of fires, and upon the vicinity to markets such as Melbourne and Geelong, where large tanneries are established. In addition, the cost of hand stripping, which was formerly 30s. per ton, has now risen to £2 or £2 5s. per ton. The price of wattle bark, which twenty-seven or thirty years ago varied from £9 to £11 per ton, now varies according to quality from £6 5s. to £7 10s. per ton. Exaggerated ideas are prevalent as to the profits to be derived from wattle plantations, and statements have been published that £10 per acre would be an average profit. Taking an average quality of poorer soils, such as granite slopes, limestone pebbles, uplands, or sandy loam, and allowing for the cost of fencing and netting to exclude sheep and rabbits for at least the first four years, the profit per acre where a plantation has been maintained successfully would be nearer £5 or £6 per acre as the results of strippings extending from the sixth to the tenth year. Assuming a profit per sheep of 4s. to 6s. per annum by their natural increase and wool, and bearing in mind the fact that the return is quicker and the profits are obtained with less risk and greater certainty, grazing is a more profitable

way of utilizing the land than wattle planting, and it will certainly not pay to convert good grazing land into wattle plantations.

In the case of the plantation at the You Yangs, fair profits are made each year; but a private owner would need to add to his profit and loss account the interest on the capital represented by the land, and on the original cost of the plantation.

In comparing the cultivation of wattles in South Africa and in Australia, it would be remembered that the former has certain advantages. Firstly, the freight to Hamburg or London is less than from Australia. Secondly, a supply of cheap black labour is available. Thirdly, in some parts of South Africa, at least, the wattles appear to be ready for stripping a year sooner than in Victoria. There is no doubt, however, that there is a considerabe amount of poor class land at present being put to no use, which might well be devoted to the cultivation of wattles. It is not likely that any one would attempt to grow wattles for profit on the carbonaceous sandstone of Gippsland, which afford rich pastures for dairying, or on fertile volcanic soils suitable for cultivation; but it may be as well to mention that wattles grown on such soils tend to be of a spindly nature, with a thin bark inferior for tanning purposes. As a rule, the best bark is obtained from granitic formations, while that from ironstone pebbles with a clay subsoil approaches and sometimes equals it. The bark from trees grown in sandy loam usually contains a little less tannic acid, but affords a good quality bark; and, in fact, yields the greater proportion of the supplies grown in Victoria.

The general trend of the facts mentioned above is to show that there is an opening for an increased growth of wattles for tanning bark in Victoria, but that there are certain risks attached to its profitable cultivation on a large scale, and that success is rewarded by reasonable but not extravagant profits. Apparently, the proper position is that it should enable land-owners to extract a profit from poor land they could not otherwise profitably utilize, and be more as a side line than as a mainstay of support. The cultivation of wattles does not appear to offer any openings to the man of small capital, to whom quick returns are essential.

UGANDA PROTECTORATE.

The Annual Report of the Botanical, Forestry and Scientific Department of Uganda for the year ended 31st March, 1912, is a clearly printed and profusely illustrated publication. It is issued by the Chief Forestry Officer, Mr. W. R. Rutter, who was an enforced visitor to the Island at the latter part of 1911 as the result of a serious illness in Colombo.

We are told that the Botanical Department has largely been responsible for the prosperity of the Protectorate by introducing and disseminating valuable seeds and plants suitable for cultivation. Among these introductions is cotton which has proved "a blessing to the natives and a boon to the mercantile community."

Of economic plants which are receiving special attention and yielding promising results are Rubber and Cocoa.

Lemon grass is being extensively cultivated as a preventative of sleeping sickness, as it very materially assists in keeping noxious vegetation in check.

Mucuna gigantea is considered the most suitable ground shade and green manure for rubber and the plantations.

THE FARMER IN HOLLAND.

An interesting book has just appeared under the title of "A Free Farmer in a Free State," by a well-known English agricultural writer, Mr. J. W. Robertson-Scott. It cannot be doubted that the Dutch farmer in South Africa will be proud of this marvellous record of rural progress amongst his countrymen in Holland, whilst his English confrère will not fail to express unstinted admiration for the genius of a people who in the face of a merciless competition have attained an agricultural prosperity unparalleled on the Continent of Europe. The Dutchmen of Holland have no soil. They manufacture it on the spot, rush a town-ship on it, and open a bank account on a quaking bog.

Holland is a very small country. It has a much smaller population (6,000,000) than Greater London. "God made the sea," says the Hollander; "we made the land." The truth of this epigram is seen in these prosperous homesteads which now dot the Haarlemmer Meer, and those half-million houses of Amsterdam which stand steadfastly on sea-driven piles. The best agricultural land in the Netherlands has been won back from the ocean. In spite of the opening of the world's vast wheat-fields, and the consequent dumping of corn on the continent, the Dutch, like the English people, have remained a nation of free traders. And the author puts this interesting problem to his readers. Suppose Great Britain adopts protection, can Holland hold out successfully as the last fortress of free trade in Europe?

The farmer in Holland has prospered because he has adopted modern methods. He was forced to do so under the pressure of foreign competition.—*The Agricultural Journal of the Union of South Africa.*

INDIGO AND CASTOR IN THE MADRAS PRESIDENCY DURING 1912-1913.

INDIGO.

Mr. D. T. Chadwick, Director of Agriculture, Madras, reports on the 14th December last that the total area under indigo in the Madras Presidency at the end of November is estimated at 60,100 acres or 33 per cent. less than the area sown in the corresponding period of 1911. The decrease is mainly attributed to the continued fall in demand and in the commercial value of natural indigo. A slight increase in area is reported from South Arcot and other districts where it is grown for manurial purposes. The condition of the crop is very fair and it is expected to yield 71 per cent. of the normal crop.

CASTOR.

The total area sown with castors in ryotwari villages up to the end of November 1912 is 339,200 acres or 4·6 per cent. less than the area sown in the corresponding period of 1911-1912. The decrease reported from the Decan is chiefly caused by a fall in Kurnool of 30,000 acres which is attributed partly to lack of timely rains and partly to the spread of groundnut cultivation. Sowings took place largely in July and August. The estimated outturn of the crop is 75 per cent. of the normal.

Villages other than ryotwari report a total area of 14,700 acres estimated to yield 78 per cent. of the normal.

MARKET RATES FOR TROPICAL PRODUCTS.

(From Lewis & Peat's Monthly Prices Current, London, 1st January, 1913.)

	QUALITY.	QUOTATIONS.
ALOES, Socotrine cwt.	Fair to fine ...	62s 6d a 67s 6d
Zanzibar & Hepatic ,,	Common to good ..	40s a 75s
ARROWROOT (Natal) lb.	Fair to fine ..	8d a 9d
BEES' WAX, cwt.		
Zanzibar Yellow ,,	Slightly drossy to fair ..	£6 17s 6d a £7
East Indian, bleached ,,	Fair to good	£8 a £8 5s
,, unbleached ,,	Dark to good genuine ..	£6 a £6 15s
Madagascar ,,	Dark to good palish	£6 15s a £7 2s 6d
CAMPHOR, Japan ,,	Refined	1s 5¾d a 1s 8d
China ,,	Fair average quality ...	167s 6d
CARDAMOMS, Tuticorin	Good to fine bold	5s 2d a 5s 8d
	Middling lean	4s 6d a 4s 11d
Malabar, Tellicherry	Good to fine bold ..	5s 1d a 5s 7d
Calicut	Brownish ..	4s 6d a 4s 11d
Mangalore ,,	Med brown to fair bold	4s 9d a 6s
Ceylon, Mysore ,,	Small fair to fine plump	4s 3d a 6s
Malabar ,,	Fair to good ...	3s 7d a 3s 10d
Seeds, E. I. & Ceylon ,,	Fair to good ..	4s 6d a 4s 9d
Ceylon Long Wild ,,	Shelly to good ..	1s 2d a 3s 2d
CASTOR OIL, Calcutta ,,	Good 2nds .	3⅝d
CHILLIES, Zanzibar cwt.	Dull to fine bright ...	40s a 45s
Japan ,,	Fair bright small ..	30s a 32s 6d
CINCHONA BARK.—lb.	Crown, Renewed	3⅝d a 7d
Ceylon	Org. Stem	2d a 6d
	Red Org. Stem	1¾d a 4½d
	Renewed	3d a 5¼d
	Root	1⅞d a 4d
CINNAMON, Ceylon 1sts	Good to fine quill	1s 3d a 1s 7d
per lb. 2nds	,, ,,	1s 4d a 1s 6d
3rds	,, ,,	1s a 1s 5d
4ths	,, ,,	1s a 1s 4d
Chips, &c..	Fair to fine bold	1d a 4d
CLOVES, Penang lb.	Dull to fine bright pkd.	1s a 1s 2d
Amboyna ..	Dull to fine	9d a 10d
Ceylon ..	,, ,,	8½d a 9d
Zanzibar	Fair and fine bright	9¾d a 10d
Stems ..	Fair	3¼d
COFFEE		
Ceylon Plantation cwt.	Medium to bold	Nominal
Native	Good ordinary	Nominal
Liberian ,,	Fair to bold	82s 6d a 90s
COCOA, Ceylon Plant. ,,	Special Marks	77s a 90s
	Red to good	72s a 76s 6d
Native Estate ,,	Ordinary to red	42s a 70s
Java and Celebes ,,	Small to good red	25s a 82s 6d
COLOMBO ROOT ,,	Middling to good	12s a 19s
CROTON SEEDS, sift. cwt.	Dull to fair	65s a 70s
CUBEBS ,,	Ord. stalky to good	150s a 170s
GINGER, Bengal, rough ,,	Fair	30s nom.
Calicut, Cut A ,,	Small to fine bold	75s a 80s
B & C ,,	Small and medium	52s a 70s
Cochin Rough ,,	Common to fine bold	3 s a 36s
	Small and D's	30s
Japan ,,	Unsplit	25s
GUM AMMONIACUM ,,	Ord. blocky to fair clean	40s a 72s 6d
ANIMI, Zanzibar	Pale and amber, str. srts	£12 10s a £14 5s
	,, ,, little red	£11 a £12
	Bean and Pea size ditto	75s a £9 12s 6d
	Fair to good red sorts	£7 a £10
	Med. & bold glassy sorts	£5 a £8
Madagascar ,,	Fair to good palish ...	£4 a £8 15s
	,, ,, red ...	£4 a £7 10s
ARABIC E. I. & Aden ,,	Ordinary to good pale	33s a 37s
Turkey sorts ,,		32s a 65s 6d
Ghatti ,,	Sorts to fine pale ...	25s a 35s nom.
Kurrachee ,,	Reddish to good pale ...	25s a 30s ,,
Madras ,,	Dark to fine pale ...	25s a 30s ,,
ASSAFŒTIDA ,,	Clean fr. to gd. almonds	£10 a £12
	com. stony to good block	50s a £9
KINO	Fair to fine bright	6d a 1s 5d
MYRRH, Aden sorts cwt	Middling to good	50s a 60s
Somali ,,	,, ,,	45s a 47s 6d
OLIBANUM, drop ,,	Good to fine white	45s a 50s
	Middling to fair	35s a 40s
pickings ,,	Low to good pale	12s 6d a 27s 6d
siftings ,,	Slightly foul to fine	20s a 22s 6d
INDIA RUBBER lb.	Fine Para bis. & sheets	4s 6d
Ceylon, Straits, Malay Straits, etc.	,, Ceara ,, ,,	4s 4d
	Crepe ordinary to fine..	4s 6d a 4 7½d
	Fine Block ..	4s 7½d
	Scrap fair to fine ..	3s 6d a 3s 10d
Assam	Plantation ..	3s 10d
	Fair II to ord. red No. 1	3s 2d a 3s 6d
Rangoon	,, ,, ,,	2s a 2s 11d

	QUALITY.	QUOTATIONS
INDIARUBBER.(*Contd.*)		
Borneo	Common to good	1s 9d a 2s 8d
Java	Good to fine red .	2s 9d a 3s 3d
Penang	Low white to prime red	1s 1d a 2s
Mozambique	Fair to fine red ball ...	3s 6d a 4s
	Sausage, fair to good ..	3s 5d a 3s 11d
Nyassaland	Fair to fine ball ...	3s a 3s 6d
Madagascar	Fr to fine pinky & white	2s 6d a 2s 9d
	Majunga & blk coated ..	1s 10d a 2s 4d
	Niggers, low to good ..	6d a 2s 9d
New Guinea	Ordinary to fine ball ..	2s 3d a 2s 9d
INDIGO, E.I. Bengal	Shipping mid to gd violet	3s a 3s 6d
	Consuming mid. to gd.	2s 3d a 2s 10d
	Ordinary to middling	2s a 2s 2d
	Mid. to good Kurpah	1s 10d a 2s 5d
	Low to ordinary	1s 6d a 1s 9d
	Mid. to fine Madras	None here
MACE, Bombay & Penang	Pale reddish to fine	2s 6d a 2s 8d
per lb.	Ordinary to fair	2s 2d a 2s 4d
Java	,, ,, good pale	2s 4d a 2s 8d
Bombay	Wild	7d a 8d
NUTMEGS— lb.	64's to 57's	10d a 1s
Singapore & Penang ,,	80's	7½d
	110's	6½d
	160's to 115's	5½d
NUTS, ARECA cwt.	Ordinary to fair fresh	14s a 15s
NUX VOMICA, Cochin	Ordinary to good	9s 6d a 12s 6d
per cwt. Bengal	,, ,,	9s
Madras	,, ,,	9s a 10s
OIL OF ANISEED ,,	Fair merchantable	6s 11d
CASSIA ,,	According to analysis	3s 7d a 3s 9d
LEMONGRASS ,,	Good flavour & colour	4d
NUTMEG ,,	Dingy to white	1½d a 1¾d
CINNAMON ,,	Ordinary to fair sweet	2⅛d a 1s 5d
CITRONELLE ,,	Bright & good flavour	1s 6d
ORCHELLA WEED—cwt		
Ceylon ,,	Fair ..	10s Nom.
Madagascar ,,	Fair ...	10s ,,
Zanzibar ,,	Fair ...	10s ,,
PEPPER—(Black) lb.		
Alleppy & Tellicherry	Fair ...	5½d
Ceylon ,, ,,	,, to fine bold heavy ..	5⅜d a 5½d
Singapore ...	Fair	5¼d
Acheen & W. C. Penang	Dull to fine	5½d a 5¾d
(White) Singapore ,,	Fair to fine	8¾d a 9d
Siam ,,	Fair	5¾d
Penang ,,	Fair	8d
Muntok ,,	Fair	9¾d
RHUBARB, Shenzi ..	Ordinary to good ..	1s 11d a 3s 3d
Canton ..	Ordinary to good ..	1s 8d a 2s 2d
High Dried..	Fair to fine flat ...	1s a 1s 3d
	Dark to fair round ..	10d a 1s
SAGO, Pearl, large ...	Fair to fine	18s a 19s
medium ..	,, ,,	17s a 18s 6d
small ...	,, ,,	15s a 16s
Flour ..	Good pinky to white ...	12s a 14s.
SEEDLAC cwt.	Ordinary to gd. soluble	55s a 65s
SENNA, Tinnevelly lb.	Good to fine bold green	5d a 8½d
	Fair greenish	3d a 4½d
	Commonspeckyand small	1¼d a 2¾d
SHELLS, M. o'PEARL—		
Egyptian cwt.	Small to bold ...	90s a £10 15s
Bombay ,,	,, ,, ...	90s a £10 7s 6d
Mergui ,,	Unsorted	£9
Manilla ,,	Fair to good £	11 10s a £14 17/6
Banda ,,	Sorts	80s a 85s
Green Snail ,,	Small to large ...	60s a 82s 6d
Japan Ear ,,	Trimmed selected small to bold	65s a £11
TAMARINDS, Calcutta...	Mid. to fine bl'k not stony	9s a 12s
per cwt. Madras	Stony and inferior ..	4s a 5s
TORTOISESHELL—		
Zanzibar, & Bombay lb.	Small to bold ..	11s 6d a 25s
	Pickings ...	14s a 19s
TURMERIC, Bengal cwt.	Fair .	22s nom
Madras ,,	Finger fair to fine bold	22s a 24s
Do. ,,	Bulbs [bright	18s a 20s
Cochin ,,	Finger fair ..	21s
	Bulbs ...	13s
VANILLOES— lb.		
Mauritius ... } 1sts	Gd cry stallized 3½ a 8½in	11s 6d a 18s
Madagascar ... } 2nds	Foxy & reddish 3½ a ,,	11s a 14s 6d
Seychelles ... } 3rds	Lean and inferior ...	10s a 11s
VERMILLION ..	Fine, pure, bright ...	2s 11d
WAX, Japan, squares	Good white hard ...	46s

THE SUPPLEMENT TO THE

Tropical Agriculturist and Magazine of the C. A. S.

No. 2.] FEBRUARY, 1913. [Vol. XII.

SIR RIDER HAGGARD AND CEYLON AGRICULTURE.

FAVOURS LAND BANKS FOR THE SMALL HOLDER.

Sir Rider Haggard, the famous Novelist, who was spending a few days in Ceylon while awaiting the other members of the Empire Trade Commission, was good enough to grant our representative a brief interview recently when he discussed the agriculture of the island, briefly but cogently. Sir Rider Haggard had returned from Kandy, having spent a short time at Peradeniya with the Director of Agriculture, Mr Lyne, and he is impressed with the agricultural possibilities of the island. The famous novelist has an appearance that belies his reputation as a creator of wonderful romance, and is

MORE LIKE A BLUFF FARMER

than the writer—and if truth were known, we believe that he would far rather gain fame from this branch of his studies than any other. He is tall with a spare frame ; deep-set eyes, a slight stoop such as is the hall-mark of the writer and student, and has a short beard, almost straggling in style, a typical scientific farmer.

"Yours is an agricultural paper is it not," he asked. Our representative admitted the fact, but innate modesty forbade him pointing out that the paper had some real claim to this title.

IMPRESSED WITH ISLAND'S WEALTH.

Sir Rider Haggard then stated that he had been staying with Mr Lyne, the Director of Agriculture at Peradeniya, and had seen all the staple products of the island, rubber, tea, cocoa, and so forth. "I am enormously interested and impressed" he said, "with the wealth of this country in the way of its agricultural resources. But it also seems to me that it might still more be largely developed. There is still a great deal more land that might be brought into cultivation."

The pressman pointed out that it was so, and also that efforts were being made month by month to bring further land into cultivation.

LAND BANKS.

"Why don't you start here land banks, and co-operative credit which will bring this land under cultivation?" asked Sir Rider Haggard. "Land banks such as are now in existence in Denmark. I am told there is a good deal of usury here; as a means of counteracting that I would suggest land banks for the small holder, that is where the circumstances of the case are suitable."

It was pointed out that the small cultivator in Ceylon appeared to look upon debt with a more favourable eye than was done in the West, to which the novelist retorted that it would be far better to owe the money to the land bank than the usurer. "It seems to me," he said, "that these people could do a great deal by such means and mutual credit societies."

Sir Rider Haggard admitted that he had not studied tropical agriculture, and the ways of the Asiatic small holder, but this was the only way he averred to deal with small holdings where ever there were small holdings, and the system seemed to prevail to a very large extent in Ceylon. "The general principles of agriculture," he remarked, "are the same all over, whether in Ceylon, or England. Certain circumstances and conditions may alter, but the general principles remain, and the only way to make small holdings successful is by way of co-operative credit. Asked briefly for the methods adopted Sir Rider referred the interviewer to his book on Denmark which gives full details of the system as it appertains there. Not, he said, until he had been to Denmark did he understand the possibilities

of small holdings, and the method by which small holdings could be successfully worked, and he had been interested in agriculture all his life and was a keen agriculturist.

Bless Rubber.

Ceylon, he thinks is, a most lovely place and its agricultural possibilities appealed to him immensely, and it was intensely interesting to see so much wealth coming from the land. "You ought to bless the very name of rubber plant," he added, "and also the tea bush."

Empire Trade Commission.

Turning to the question of the Trade Commission on which he is engaged our representative asked why Ceylon had been left out. Sir Rider Haggard's was, of course, the obvious answer that the Commission only applied to the self-governing dominions —Australia, New Zealand, Canada, South Africa and Newfoundland. Pressed as to whether he did not think that Crown colonies such as Ceylon with its vast trade with the home country should also not be favoured with an enquiry, he shrugged his shoulders and said that was a matter for Government, and one on which he would not commit himself. The aims of the Commission are to enquire into the commerce of the Empire, the financial resources of the self-governing dominions, communications, immigration, etc,, etc. Had their labours extended to the other colonies, he remarked, that they would never have ended.

"A White Australia."

Our representative also tried to persuade Sir Rider Haggard to express an opinion on Australia's endeavour to build up a "White Australia" in view of the tropical conditions which prevail to such a large extent there, but he declined to give any definite views, excusing himself on the ground that he had never been to Australia. It was pointed out that if the Commission was to visit Australia and discuss emigration, the matter in relation to the southern continent would eventually have to be considered, but the famous novelist again excused himself,

In bidding farewell Sir Rider again impressed the importance of co-operation and credit banks, and said the enormous prosperity of the island would be still more enormously increased if the population so affected could be persuaded to have such a system.

DYNAMITING TEA SUBSOIL IN SOUTH SYLHET.

A NOVEL DEMONSTRATION.

South Sylhet, Feb. 1.—"Deep Cultivation made Easy." So the dynamite demonstration was described by some of the planters present at Sathgao Tea Estate on Jan.27th to see Messrs Nobel's representative—Mr G Macqueen—perform the wonderful method of soil cultivation by dynamite. A large and representative number of the tea planting community from the surrounding districts responded in person to the kind invitation of Mr and Mrs Robert Fraser, whose genial hospitality has become a matter of course in the western half of the South Sylhet district. The demonstration was held about two miles to the north of Sathgao factory and was carried out on both cultivated and uncultivated fallow land.

Laying the Charges.

In the cultivation, which was growing two year old tea, the shots were inserted at a depth of from two to two-and-a-half feet. The auger used for drilling the holes in the soil was of a special construction and it was remarkable how quickly and easily a coolie could send it into the soil. Dynamite cartridges of 2 ounces were in the majority of cases used, but half cartridges, and as much as four ounces in some cases, were also experimented with. The distance between the holes was 12 feet, so that one cartridge was used for a square mill of 144sq. feet or, say, 302 to the acre. Twenty-five charges were inserted, and as the fuse was timed to two minutes it allowed of plenty of time for the firer to touch his appointed number with his cigarette and clear out of the danger zone. As a matter of fact, with ordinary care, there appeared to be little danger attached to any part of the performance. The onlookers standing at a distance of forty feet were quite safe, as all the force of the explosion appeared to be exerted in the sub-soil.

The Explosion.

When the charge exploded there was a thud, as if a tremendous blow had been delivered underground; at the same instant he soil in the vicinity of the shot heaved upwards. The bushes were not in the slightest way disturbed, but upon the ground being dug up a different state of things was revealed in regard to the hard subsoil. It was very noticeable that the force of the explosion had ejected the shattered hard subsoil right up through the surface soil, so that the effect of the shot had been the means of partly

mixing the surface and sub-soils. When the seat of the explosion was dug down to it was found that a round hole had been made, about a foot in diameter, which was full of smoke. The sub-soil was considerably cracked, and no doubt as much larger number of smaller fissures had been made, radiating from the centre of disturbance. These would all be immediately filled with air, and, by and bye, with rain water containing carbonic acid, so that even one course of dynamite would hasten the process of bringing the sub-soil into the state in which its dormant constituents can be successfully attacked by the roots of the tea plant.

EFFECTS OF THE EXPLOSION.

The proceedings were rendered all the more interesting by the lucid manner in which everything in connection with the dynamite charges, was explained by Mr Macqueen. The expert appeared to handle everything with a confidence which could not do otherwise than engender a similar feeling in the lookers on. The opinion of the planters was a very decided one that, as far as tea cultivated was concerned, dynamite could not compete with the cooly and his kodaly. As each dynamite charge, with fuse and detonating cap, costs 4 annas, it would require an expenditure of R75-8-0 for this material an acre. The labour would still have to be added to this figure. By using one charge for an area of 18 feet square, allowing 9 feet to be acted upon on every side of the charge, the cost would be brought down to R35 an acre, approximately. It was a very general opinion that the cost, however much it could be reduced, would be prohibitive. The conditions would most likely be very much altered, if not entirely reversed, in a new country where subsoil cultivation was required and where labour was scarce and expensive. Even under certain circumstances in some of the operations in tea cultivation, dynamite might have its chance, but that would be for the planter to find out for himself.

SOME "DONT'S" FOR DYNAMITERS.

Mr Macqueen, in his lectures, stated that the dynamite he was using had a certain amount of potassium nitrate, as well as a certain kind of 'wood meal' entering into its composition which it was considered rendered it more adaptable for the purpose of sub-soil cultivation. It had a slower heaving power than the ordinary dynamite, which simply meant that its expanding gases after combustion did not require a large scope so suddenly as the dynamite used in blasting rock. He hoped it would not be inferred from what he had just said that dynamite in any form did not require always, under all circumstances, to be treated with every respect. No liberties must be taken with it. He would say, 'Don't have the cartridges in a damp place and don't leave them lying about where children can get at them. Always keep them under lock and key. Don't smoke while handling them or leave them near a naked light. Don't, when loading a hole, allow a crowd of people to stand close by watching. Don't forget that you are handling explosives, and don't forget to treat them as such. Don't use anything but a wooden rod for tamping. Don't pound or strike either the charge or the tamping when loading. Don't carry cartridges in your pockets while working. Don't clamp a detonator on to the fuse with your teeth. Don't try to get the composition out of a detonator, or it will certainly explode. Don't carry detonators loose in your pockets. Don't use too short a fuse; give yourself plenty of time to get away. Don't untamp a shot; bore another hole a distance of not less than 12 inches away. Don't neglect to make the detonator water tight when firing in wet holes.' There were some more 'Don'ts' mentioned, but as they applied only to frozen dynamite they are not of much concern to tea planters.—*Statesman.*

INDIGO IN MADRAS.

BARON SCHROTTKY'S SUGGESTION.

Baron Schrottky de Schrottzynski, in the course of a letter to the Hon. Secretaries, Central Agricultural Committee, Madras, writes:—

I know of no reason why the cultivation of *Indigofera arrecta* should not be successful in Madras, if the experience acquired elsewhere is fully taken advantage of. It took fully four years before planters in Behar learnt how best to grow this indigo, but the experience gained there has enabled its successful introduction into the dry Districts of Gorakhpur,

INTO CEYLON

and Singapore. It is a hardier plant than either *Indigofera tinctoria* or *Sumatrana,* excepting in the very earliest stages of its growth, and it withstands long periods of drought better than either of these latter. Your District Associations should take the matter in hand and grow an acre or so in every one of the Madras indigo districts. It must be a surface sowing, and December-January would be a good time for sowing.

I am, however, of opinion that, even with the cultivation of the ordinary varieties of indigo, especially of the Nandyal plant, there is every prospect of indigo manufacture in Madras becoming once more a profitable undertaking, if better methods of manufacture are adopted and the dye marketed in the form of a paste. Fact-

ories are still in existence, and the labour and supervising native staff have not yet forgotten what they learnt from their fathers. The ryots would gladly resume indigo cultivation, if they could get for their crop again what was paid in 1894, for they have learnt to appreciate the great manurial value of the *seet*, or indigo refuse. Your Committee doubtless appreciates the great benefit which would result from a successful revival of the indigo industry in Madras, and from raising indigo cultivation from 60,000 acres, at which it is now, again to over 500,000 acres, which it was 18 years ago. With the new methods of manufacture a return of dye, of the gross value of R120 per acre, can be obtained, while the manurial value of the residue, the *seet*, obtained from an acre under indigo, cannot be put down at less than R90. Indigo can therefore become once more a valuable crop; it is a plant which does not exhaust the soil, for it draws its nourishment from strata not reached by ordinary crops, it requires no manure and is one of the plants that enrich the soil, a fact that is well known.

Indigo harvest and manufacture give employment to agricultural labour at a time when there is little demand for it for other crops, and for all these reasons there is no other staple product that has as much to recommend it.

I need not refer at any length to the causes which have reduced the cultivation of the indigo plant in Madras from 500,000 to 60,000 acres. They are well-known. The competition of a synthetic dye has reduced prices to a level at which it does not pay to produce natural indigo on the old basis. One hundred and twenty bundles of green plant (each bundle weighing 100-120 lb.), or say 12,000 lb. can be produced in two cuttings from an acre of land in Madras. This fills a steeping vat of 1,000 cubic feet content, and the outturn therefrom is, on an average, 25 lb. of indigo costing R25 to manufacture, and selling at about R25 to R32, according to quality. The margin of profit to the manufacturer is therefore very small under the best circumstances, and but for the great value of the *seet* no indigo at all would be grown in Madras. With new methods of manufacture and marketing the dye as a paste, very different results can be obtained. The outturn in Ceylon from 100 lb. green plant has been 3 lb. of a 20 per cent. standard indigo paste, the value of the paste being As. 8 per lb. Estimating the outturn in Madras at only 2 lb. of standard paste per 100 lb. green plant, the outturn from 12,000 lb. plant can safely be taken at not less than 240 lb of standard paste, value R120, *M. M.*— Jan. 16.

DUTCH RUBBER CO. DIRECTOR IN COLOMBO.

RUBBER TAPPING AT FOUR YEARS IN SUMATRA.

Labour Conditions: and Government Regulations.

We had a recently call from M. Emile Lejeune Vincent, Director of Java and Sumatra Rubber Companies with the following titles:—Sumatra Caoutchouc Maatschappy, and Ned. Ind. Rubber en Koffie Cultuur Maatschappy enz—beside a Trust Company which finances others, who arrived with his nephew on a fortnight's visit to Ceylon on his way to Sumatra and Java, While here he hopes to make himself as much as possible acquainted with rubber and coconut estates, and will visit Kalutara and the Kelani Valley more particularly, as well as Henaratgoda gardens, and a coconut estate at Veyangoda.

M. Vincent tells us that they have now 2,500 acres under rubber in Sumatra and his Company hope to increase it to 3,500, they have been able to tap quite comfortably at four years, the rubber from the young trees tapped being valued on the continental market at only two pence to three pence per lb below the best crepe from the Middle East. It was in December 1911 that the first tappings were made from rubber planted at the end of 1907. The tapping had then to be stopped owing to the unprecedented drought in Sumatra for three months from the beginning of last year. Since then, tapping from trees in bearing amounted to about five thousand lbs per month on an average, December being the best month of 1912.

Javanese Contract Labour.

The labour used is nearly all Javanese, the women especially becoming adepts at tapping after very little training, and able to cover 225 trees per day, whereas in Java the best expert tappers have reached as many as 325. The wages amount to 35 gulden cents, 70 centimes or 42 Ceylon cents per day. The local Sumatran labour is almost entirely used for the heavy work, felling, clearing, roading, draining; and is not so well adapted to and scarcely ever used for the more delicate operations of tapping, carefully and to a fraction of an inch. All the Java labour comes under contract to Sumatra and the rate is fixed for the whole period. No planter can take over another man's labour without referring to him on the subject, though there is a certain amount of local free labour, which can go and come as it pleases. The trouble

experienced in Ceylon with regard to local recruiting, M. Vincent said, occurred in a very small degree in Java—owing to the prevalence of the contract system and its full recognition by planters. Government's supervision of the estates is also exacting, the managers having to send in regular returns, not only of the labour employed, but of those who are sick, as well as having to report instantly any cases of death, etc. Government sanitary inspectors are sent round four times a year to inspect the whole labour force: the hospital, which each property is bound to erect and maintain for itself; and the sanitary conditions generally. In the case of bolters, the Sumatra planter has an advantage over his Ceylon *confrère* in that Police are supplied by Government; they reside on each estate, especially for the purpose of dealing with offenders in the labour force. A man is arrested if he only comes to an estate with no credentials from elsewhere, and if he is not able to explain his arrival in search of work, satisfactorily.

M. Vincent is also closely interested in Tea culture, and was anxious to obtain up to date practical publications from this office on the subject. He and his nephew resumed their voyage by German steamer for Singapore on Feb. 9th on their way to Sumatra and Java.

THE NIPA PALM INDUSTRY IN THE PHILIPPINES.

WHY NOT IN CEYLON AS WELL?

Mr. H. D. Gibbs of the Bureau of Science, Manila, has contributed an interesting paper (first read before the International Congress of Applied Chemisty, and afterwards published in the *Louisiana Planter* of November 30th last) on the products of the Nipa palm (*Nipa fruticans*). This palm, which generally occurs near estuaries of rivers, is found along the South-west coast of the Island, and is common about Bentota and Gintota, the name of the last place being derived from the native name of the palm (Gin-pol). The composition of the sap of the nipa is remarkably similar to that of coconut and other palms tapped for toddy or, as it is called in the Philippines, "tuba." As the sap flows, it is practically neutral and contains no sugar but sucrose; but the inversion of sucrose and the resulting process of fermentation commence almost immediately after extraction. So far as the Philippines are concerned, the nipa is the most important source of alcohol.

The palm is specially suited to swampy lands subject to daily overflow by tides, so that such areas, which are fairly extensive and fit for nothing else, might well be devoted to it. The tree fruits four years after planting, and tapping can begin in the fifth year. After the formation of fruit the stalk is cut across near its top, usually just below the fruit, and each day a thin slice is removed, and a clean sweet sap exudes from the wound. This is daily collected and carried to distilleries with the aid of boats. Good specimens of the palm have been known to yield sap on a commercial basis for as long as 50 years.

It has been computed that no less than 90 million litres of the sap are produced annually in the Philippines. Pot stills, which are unreliable, give a liquor containing from 20 to as much as 55 per cent alcohol; with continuous process stills, results are more constant (about 50 per cent), while into the use of modern rectifiers alcohol with 93 to 96 per cent spirits is got. A distillery now working produces 93 per cent alcohol at a cost of less than ·04 dollar (American) per litre, or say 12 cts. per quart. Approximately 10 million proof litres are produced annually by about 30 distillers. Among the beverages prepared is one which, after aging in wood, is said to possess all the characters of the best brandy.

Sugar is not produced in commercial quantities, though it is considered that a thriving industry is possible. A conservative estimate of production is as follows:—2,000 palms per hectare yield 86,000 litres sap containing 12 per cent recoverable sugar equivalent to 10·75 kilograms of 96 per cent centrifugal sugar. An equipment corresponding to a 500 ton sugar mill can be kept running for 180 days a year on the sap of 750 to 1,000 hectare of Nipa, and should produce annually about 9,000 tons of 96 per cent sugar.

Mr. Gibbs goes fully into the details of manufacture, and declares his strong conviction that more profit is to be made from Nipa by sugar refining than by distillation. In this connection he mentions that he is fully aware of similar claims for the kitul (*Caryota urens*) and sugar palm (*Arenga saccharifera*) having never been realised, but is of opinion that the difficulties encountered with these palms do not exist in the case of Nipa.

Under the circumstances it would be worth while exploiting the palm that occurs locally, with a view to ascertaining whether the same favourable conditions exist here as in the Philippines for establishing a profitable industry whether in the production of spirit or sugar,

THE SOLUBILITY OF BASIC SLAG: IMPORTANT TO PLANTERS.

79, Mark Lane, London, E.C., Jan. 24th.

DEAR SIR,—The enclosed article may be of sufficient interest to re-publish in the *Tropical Agriculturist* as many planters and agents are purchasers of Basic Slag, the solubility of which, I believe, from my researches, is largely due to the proposition of caustic lime which, on coming in contact with moisture, becomes broken up in consequence of the expansion due to the absorption of water.—Yours faithfully,

JOHN HUGHES.

THE SOLUBILITY OF BASIC SLAG.

[*By John Hughes, F.I.C.*]

In a paper on "Basic Superphosphate," read by the writer in April, 1901, before the London Section of the Society of Chemical Industry, it was pointed out that the statement that ordinary basic slag contained 20 per cent of free caustic lime was obviously incorrect, because such an excess of lime would indicate a wasteful method of manufacture, for lime was only added in sufficient quantity to remove the phosphorus and silica existing in the original iron ore.

It was further mentioned that probably 2 or 3 per cent was the utmost caustic lime usually present in commercial basic slag. Recent investigation by the writer tends to indicate that the existence of caustic lime, even in small proportion, exerts a most important influence in rendering the slag soluble in the 2 per cent solution of citric acid, which, under the provisions of the Fertilisers and Feeding Stuffs Act, 1906, has been prescribed as the standard solvent for this material.

In the following analyses the figures represent the general composition, also the relative solubility in the above solvent :—

GENERAL COMPOSITION,

	No. 1.	No. 2.	No. 3.	No. 4.
Fine powder passed through standard sieve, 10,000 holes to square inch ..	90·89	75·74	70·92	96·15
Total lime ..	51·85	48·10	46·45	41·97
Phosphoric acid ..	19·45	17·90	18·80	10·95
Oxides of iron, manganese, magnesia, &c. ..	23·75	27·20	27·45	30·07
Insoluble silicious matters ...	4·95	7·80	7·30	17·01
	100·00	100·00	100·00	100·00
Equal to phosphate of lime ..	42·46	39·08	41·04	23 91
Containing caustic lime ..	3·66	2·50	1·43	0·22

SOLUBILITY IN 2 PER CENT CITRIC ACID SOLUTION AFTER AGITATION IN BOTTLE FOR HALF-AN-HOUR.

Soluble lime ...	42·77	40·76	37·52	26·12
Soluble phosphoric acid .	15·60	16·55	16·30	1·80
Equal to phosphate of lime...	34·05	36·13	35·58	3· 3

It will be noticed that fine grinding *alone* does not ensure future solubility, for Sample 4, which is the finest ground, shows the *lowest* solubility; while Sample 3, which is the coarsest powder, shows a very high solubility.

It is interesting to notice that the citric solution, though it fails to dissolve much of the phosphoric acid in No. 4, dissolves a very considerable proportion of lime, namely, 26·12 per cent, which probably explains why basic slag, which yield a low solubility of phosphoric acid, nevertheless, supply a relatively large quantity of lime in a very finely divided state, and consequently if applied to soils deficient in lime and decidedly damp and sour, may produce a very satisfactory improvement in the pasture at a relatively *small cost.*

It might be contended that the solubility might be due to the relatively high proportion of lime associated with a low proportion of silica; but such is not the case, for a sample containing 18·20 per cent of silica and only 39 99 per cent of lime showed a solubility of 35 36 phosphate of lime, though the grading was only 77·12.

It seems, indeed, quite natural that the presence of caustic lime causes the minute fragments of the slag to burst on the absorption of moisture, and thus mechanically materially promotes the subsequent solvent action of the citric solution, and that when caustic lime is not present the solvent action is very much less effective.—79, Mark Lane, London, E.C. —*Chemical News*, Jan. 24.

TEA IN FORMOSA.

Consul Samuel C Reat, Tamsui, writing on the future of Formosa Oolong tea says :—"No industry of Formosa has continued with so little change and innovation as has tea culture. For the last 15 years the total production has varied little, and the aggregate area has remained virtually the same. The opening up of new plantations has indicated the abandonment of old plantations of practically the same acreage.

"The conservatism of the native Chinese, it is averred, prohibits the production beyond the usual yield of 20,000,000 lb., lest the value be thereby decreased. When any year's crop exceeded a previous record, the cause was favourable weather conditions, and not due to any extension of the cultivation.

"The total area of tea plantations in Formosa at the end of 1911 was 83,452 acres, a decrease of 502 acres compared with the preceding year."

ANNUAL OUTPUT OF OOLONG.—The figures bellow, stated in half chests of approximately 40 pounds weight, represent the total output of Formosa Oolong (exclusive of Powchong) from the opening of the market in 1867 to the present time. The first shipment to America was made by John Dod in 1869.

Season.	Half chests.	Season.	Half chests.
1867 ..	7000	1890 .	372000
1868 ..	12000	1891 ..	381000
1869 ..	15000	1892 ..	385000
1870 ...	25000	1893 ..	466000
1871 ..	32000	1894 ...	426000
1872 ..	50000	1895 ..	424000
1873 ..	60000	1896 ..	457000
1874 ..	75000	1897 ..	500000
1875 ..	125000	1898 ...	400000
1876 ...	150000	1899 ..	400000
1877 ..	200000	1900 ..	400000
1878 ..	200000	1901 ..	380000
1879 ..	250000	1902 ...	460000
1880 ..	282000	1903 ..	515000
1881 ..	301000	1904 .	450000
1882 ..	281000	1905 ..	467000
1883 ..	307000	1906 ..	468000
1884 ..	306000	1907 ..	450000
1885 ..	373000	...	
1886 ..	362000	1908 ..	450000
1887 ..	385000	1909 ..	470000
1888 ..	393000	1910 ..	475000
1889 ..	381000	1911 ..	532000

TEA CENTRES—TENANTRY SYSTEM—OUTLOOK.—The largest plantations are in the Prefecture of Toyen, the largest two comprising 25 acres each. Taken as a whole, Doraken, of the Toyen Prefecture, is the centre of the tea country, having plantations embracing 10,000 acres. The next in importance are Sansaho and Shinchiku Prefectures, having groups of plantations covering some 1,250 acres. The very select teas come from Chop Goa Hune, Pai Chee, and Suey Tun Kan districts grown mostly on western slopes. There are four crops of tea, the spring and summer pickings being the most desirable.

While the Formosan Government is not fostering any plan for the extension of this industry some landowners have adopted a tenantry system, with the following provisions: A term of 20 years is fixed between the landlord and tenant. The first year the landowner pays dol. 35 per ko (2·44 acres) as aid to the tenant. This payment continues for three years; from the fourth year the tenant pays dol. 9 per ko annually. The first crop of tea is expected three years after planting. Within the past two years there have been over 750 acres of tea plantations thus opened up in the territory of the aborigines in the districts of Taihoku and Toyen.—*I. P. Gazette*, Jan. 11.

CEYLON PLANTER ON MANURING RUBBER TREES.

(To the Editor, "Straits Times.")

Sir,—A copy of Vol. 1, No. 6 of the Agricultural Bulletin of the F.M.S. has come into my hands which I have read with great interest. The article on "Soil Analysis" by Mr. Barrowcliff and that on "Manuring" by Mr. R. W. Munro show that these questions are still more or less in the stage of discussion in the F.M.S. as compared with Ceylon, where manuring is almost universally recognised as a *sine qua non* to the best results of cultivation and there is scarcely an estate which does not include manuring in its annual estimate of the C.O.P. As a practical planter, I am tempted to offer the following remarks á propos of the two articles above mentioned, which I trust will not be taken amiss.

In the first place Mr. Barrowcliff states that in producing 400 lb. of dry rubber per acre

3½ lb. Nitrogen
3 ,, Potash
1¼ ,, Phosphoric acid

are removed, while an average crop of wheat takes

41.7 lb. Nitrogen
36.5 ,, Potash
20.5 ,, Phosphoric acid

out of the soil.

Now while these figures are correct he overlooks the all important fact that wheat is a field crop, and the wheat a direct product, whereas latex is only an indirect product which we obtain by the unnatural method of removing bark. The largest and healthiest trees produce naturally the most latex. When we apply manures, therefore, we aim at the indirect increase of latex by the direct nourishment of the trees, by adjusting and rendering available the necessary plantfood ingredients, the balance of which is naturally upset by the continuous drain on the soil by a perennial such as rubber. A system of tilling and mulching as upheld by Mr R W Munro is greatly beneficial wherever and whenever practicable, but for treee in tapping, is of itself insufficient. The tree may produce satisfactorily for a considerable time without artificial fertilizers, but the tree is none the less being slowly starved and rendered more liable to disease.—Yours, etc..

H. F. NAUGHTON.

Colombo, February 1, 1913.
—*Straits Times*, Feb. 11.

Dry Regions or Bush Land are turned into well Paying Estates.

by planting the new rubber varieties :

Manihot Dichotoma for a firm, clayey soil.

Manihot Piauiensis for a light, sandy soil.

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:: **A. B. C. Code 5th Edition.** ::

THE PLANTER OF THE FUTURE.

AN INDIAN VIEW.

"The Planter" of the future, according to our ideal, will be the man who will think for himself, and observe and investigate for himself, instead of relying on his Scientific Officers to do what as a matter of fact he should do himself. He will be a man with ideas, and will not rest content until he has made them fructify. Further, he will be a man of great mental calibre, his intellectual qualities well disciplined and trained to take a wide outlook. He will be essentially self-reliant, and instead of leaning on extraneous aid, will he rather assist his Scientific Officers in their investigations. He will not need to be a man of great learning nor a scientist. Nature will be his sole laboratory. He will keep his ears and eyes open and in his own way, by quiet and unostentatious, yet withal, keen observation and scrutiny gradually wrest the secrets of Nature from her. The more he learns the more humble he will be, for he will only then recognise his utter ignorance compared with the great ocean of knowledge remaining to be navigated. Such a man will be the "power" who will "take and keep." This is the stamp of man the great Indian Tea Industry will need in future years, if it is not to be swamped and ousted by foreign competitors. We have in our midst at the present time highly educated men, University and Public school men, able to hold their own in the best of society, of fine physique and prowess in all the various fields of sport. This is right and proper, and it is good that it is so. In this country it is essential that planters should make a brave show and so far as volunteering goes, the planters are undoubtedly an asset the Empire has reason to be proud of for its defence, for they would prove a veritable help in time of trouble, as has already been proved. This, however, is only an adjunct to "the Planter's" life. His serious business—and business it is—is to make his garden pay. Tea planting is not a philanthropic or altruistic business—at any rate the Board of Directors and shareholders do not look upon it as such. They want dividends, and good ones at that. Woe betide the men who cannot give them, provided he is supplied with the "tale of bricks." Apart from this digression, to return "to our muttons," whilst acknowledging that "all work and no play" is bad for the constitution, the question arises whether there is not too much of the latter. There are some planters who take study of questions seriously as is evinced by their writing to our contemporaries. To them we owe all due meed of praise. They are "the salt of the earth," and they are men who deserve encouragement, for they strive their best to disseminate knowledge, and their contributions are read with interest, although it may be that all parties do not agree with their opinions.—*Indian Planters' Gazette*, Feb. 15.

THE BALATA (RUBBER) INDUSTRY OF BRITISH GUIANA.

The latex of the bullet or balata trees, when dried furnishes the substance commercially known as balata. The collecting of balata has, within the last four years, been most extensively carried on in British Guiana, so much so as to have now become not only the foremost forest industry, but, judged by the value of the exports, the

THIRD MOST IMPORTANT ONE OF THE COLONY.

The yields per tree vary considerably, the flow being best in the rainy season. In very dry seasons many of the trees do not flow at all. The yield of a tree depends on several circumstances, the size, individual character, etc. Under favourable circumstances a tree fifteen to twenty inches in diameter, bled eight feet high, will yield three pints of milk. The average yield works out at about four pounds of balata per tree on the first occasion of tapping. On subsequent tappings the yields are said to be less. The bullet tree is considered to be of very slow growth, but so far little is known with regard to the time it takes for a tree to grow sufficiently large to be fit for tapping, much less how long it takes to reach maturity. A balata tree planted in the Botanical Gardens in Georgetown in 1880, according to a report by the Department of Lands and Mines in Demerara, has a trunk forty-eight inches in girth and branching eight feet from the ground, being over all about fifty feet in height. The tapping of the trees under the existing regulations is now restricted to one-half of their girths, and the incisions in the bark must be so made that they do not cross each other, but run one into the other, conveying the latex towards the base of the tree.

STRICT TAPPING REGULATIONS.

The incisions formed in the bark must not be more than an inch and a half wide on the outside, should not be closer than ten inches, and must not penetrate the full depth of the bark. No balata tree is allowed to be bled that measures less than thirty-six inches in girth at four feet from the ground, and no tree may be re-tapped until the wounds in the bark caused by previous incisions have completely healed, which usually takes from four to five years. Any person who fells, destroys, or bleeds any balata tree in contravention of the regulations is liable to heavy penalties. The cuts are usually made to a height of from twelve to fifteen feet only, on the first occasion of tapping, but on the next occasion they are frequently extended right up the trunk to the juncture of the first branches and sometimes higher. Tapping operations are as follows. The bleeder starts by cutting two oblique channels, extending half-way round on the trunk near the base of the tree, below which a niche is cut in the bark in which a calabash is inserted by the brim, so as

TO CATCH THE LATEX.

A series of similar oblique channels are then cut at about ten inches apart in criss-cross or feather-stitch pattern, each upper channel entering the lower one in alternate succession so as to continue one above the other in two vertical parallel alignments, a short distance apart up the trunk of the tree. The milk so collected is then poured into gourds or kerosine tins, and transported in these to the main camp, where it is placed in specially prepared shallow trays called "dabrees," in which it is exposed to the sun and air to dry. Each dabree is provided with an adjustable weather-screen constructed of palm leaves, by which the tray can be protected in case of rain. As soon as the upper layer has become sufficiently thick and firm to allow of removal, it is taken off, hung up first, inside out, to drip, and the sheet so obtained is then removed to a shelter to complete the drying. This process is continued until the tray is empty, but fresh supplies of milk are often added to the dabree tray after the removal of the dried layers. When dried in the dark balata is of a pure white colour, but on exposure to light it turns a pinkish colour, and eventually becomes a deep, dull-red colour. Block balata is prepared by the more rapid process of boiling the latex and then running it into moulds to dry, and when treated in this way it assumes a dark or blackish colour, but in this form it is in disrepute, as many odds and ends have been found embedded in the thick blocks, purposely added to increase weight, and so defraud the purchaser. In Venezuela

THE FELLING METHOD OF COLLECTING THE MILK

is invariably practised. This method, though at first used in British Guiana, is now against the law there, as it also is in Dutch Guiana, and the standing method is now adopted in both these colonies with such restrictions as to safeguard the life of the tree. By the felling method, which involves a comparatively small extra amount of labour, the returns immediately obtained are far and away in excess of those obtained by the method of tapping the trees while standing. The felling method is undoubtedly a most wasteful one, as the forests are denuded of valuable trees. There are no reliable data available as to the yields obtained on the successive tapp-

ings made after the tree has first been bled, the class of men employed as bleeders and the condition under which the work is carried on being such as to render it difficult, if not impossible, to obtain such data. Yet the indisputable fact remains that tracts of Crown lands, on which the balata trees were first tapped a quarter of a century ago, are still being worked, and continue to yield supplies of balata. Beside the balata trees, there are other trees in the forests of British Guiana which produce latex in appreciable quantities The most important of these is the "Swamp Mabua," or "Mabwa" of the Arawaks, also known to the Carib Indians as "Touchpong," to the Akawois as "Kuina-ek, and to the Arecuna Indians as "Ky-cher." This species yields a rubber of good quality which has been exported for many years. It is usually classed on the market as "Orinoco Scrap," and frequently fetches good prices. Specimen biscuits of it prepared for the Rubber Exhibition, 1909, were exhibited there.—*Journal Royal Society of Arts*, Feb. 7.

INTERESTING 1913 RUBBER FORECAST.

Messrs J A Henderson and Co., Limited, in a circular state that they are fully well aware that it is unsafe to prophesy unless one knows, and in putting forward the following figures they do so more with the object of placing the apparent facts before their friends rather than forecasting the market. Assuming that consumption increases in the same ratio as it did in 1912, the following, they consider, would be the approximate position for 1913 :—

ESTIMATED WORLD'S SUPPLY (TONS).

	1911.	1912.	1913.
Amazonas and Brazil	39,000	40,500	40,000
West African	15,000	13,800	13,800
East African, &c.	5,300	4,000	4,000
Central American, &c.	2,500	2,500	2,500
Plantation	14,200	28,500	38,000
	76,000	89,300	98,300
Guayule	9,200	7,000	7,000
Malaysian, &c.	2,800	2,700	2,700
Totals	88,000	99,000	108,000

ESTIMATED CONSUMPTION (TONS).

	1911.	1912.	1913.
England	12,000	14,500	17,520
Germany, Austria, &c.	14,000	16,000	18,286
France	8,000	9,500	11,281
Russia	8,500	9,000	9,529
Italy, &c.	2,000	1,500	1,125
Japan and Australia	1,500	1,000	667
America and Canada	42,000	47,000	63,720
Total	88,000	99,000	112,128

—*L. & C. Express*, Jan. 24.

RUBBER PLANTATIONS: COST OF DEVELOPING.

Sir,—Will you, or any of your readers kindly inform me as to what may be considered the general cost of developing a rubber estate (Para rubber)? How do the undermentioned rates, for instance, compare with those in other Rubber Companies in the East? On an area of 1,500 acres, in two years, the cost has been say

	R	A	P
(1) Management [including office expenses, establishment, travelling expenses, Directors' fees, salaries, medical fees, and sundry expenses] ...	64,500	0	0
(2) Buildings (bungalows and coolie lines] ...	19,000	0	0
[3] Furniture and motor car ..	8,500	0	0
	2,000	0	0
[4] Demarcation of land and survey fees ...	1	8	0
[5] Nursery, seeds, and plants ...	5	8	0
[6] Felling, clearing and burnin ...	27	4	0
[7] Fencing ..	1	0	0
[8] Weeding and supplying ...	28	0	0
[9] Lining, holing and planting	25	0	0
[10] Fertilising ...	0	1	6
[11] Pruning and supplying ..	1	4	0
[12] Tools and stores ..	2	4	0
[13] Roads and drains ...	1	12	0
[14] Miscellaneous ..	0	3	0
Total	93	12	6

Items 4 to 14 (on 1,515 acres) represent about R142,000 against (items 1 to 3) R92,000. Is this a fair proportion? If the approximate cost of items 1 to 14 could be given, on, say, 1,500 acres, it would be of great interest to others, besides myself.

Soulanga, 25th Jan. S. G.

—*M. Mail*, Jan. 29.

"CULT OF THE COCONUT."

Interesting Exhibition in Regent Street.

In few British possessions has progress been more rapid in recent years than in the West Indies. In ten years their total volume of trade has risen from £16,000,000 to £21,000,000. The prosperity is due in no small measure to the assiduous attention which has been devoted in modern times to the cultivation of coconut plantations. The great advantage of the coconut tree which produces according to size 50 to 400 (*sic.*) nuts per annum (new flowers, young nuts, and ripe nuts all growing simultaneouly), lies in the number of uses to which its products can be put...In connexion with the industry an interesting and instructive exhibit is now to be seen in the windows of 3, Regent-street, Pall-mall, S W, which shows the coconut in its natural state as well as in its various processes of manufacture into articles of such daily use as ropes, door-mats, brooms, mattresses, soaps, margarine,

SALES OF PRODUCE IN BRITISH AND CONTINENTAL MARKETS.

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lard, fibre used in the cultivation of bulbs, electric-lamp carbon, and linoleum made from the shell, and, lastly, cattle-food cake, which is manufactured from the pure residue of copra, the name by which the dried white coconut is technically known. In order that the slightest misapprehension may be removed from the minds of the unsophisticated there has been placed side by side with the other exhibits a specimen of the cocoa bean (theobroma cacao), which is, of course, quite a different product to the coconut (cocos nucifera).

The display is attracting considerable attention, and is certainly worth inspection.—"Westminister Gazette," Feb. 1.

SISAL HEMP CULTIVATION.

The following is a summary of an article published in the "Verhandlungen des Kolonial-Wirtschaftlichen Komitees" (Berlin) :—The cultivation of the sisal plant in German East Africa has been carried on for some twenty years, and it may be asserted with confidence that excellent results have been achieved and that there is a promising future before the sisal industry in that Colony. No less than 11,212 metric tons of sisal hemp, valued at 4,530,000 marks (about £222,700) were exported from German East Africa in 1911, and it is authoritatively stated that the figure will reach 16,500 metric tons in 1912, and probably 20,000 metric tons in 1913. The advantages of growing the agave (sisal) plant are that it will thrive in different soils and under varied conditions. It is a good policy for the planter in growing sisal hemp to extend the area of cultivation as much as possible, for it should be recognised that a profitable use of the fibre separating machine can only be made by treating 100,000 to 120,000 leaves per working day. There is undoubtedly a shortage of native labour, and until that is solved it is premature to discuss the question of cultivation on a very extensive scale. According to expert opinion the prospect of overproduction is somewhat remote, as the world's demand for fibre is constantly on the increase. As regards prices, even if they fell considerably below their present level, the cost of growing would still leave a fair margin of profit. [Metric ton=2204·6 lb.]—*Board of Trade Journal*, Jan. 30.

RUBBER IN BOLIVIA.

An Argentine official's report appearing in the *Board of Trade Journal* on Rubber in Bolivia gives interesting information, especially as to the handicap that lack of labour affords. But the figures offered were inconsistent. We were told of 65 acres in the Colonial Territory on both sides the Lower Beni with annual production of 557,920 lb—giving the unheard of average of 8,583 lb. per acre! In the Santa Cruz department, however, 87,000 acres produced 264,500 lb. annually or an average of 30 lb. per acre per annum. Figures do not appear to be the strong point of the Argentine *Chargé d'Affaires*, whose report (containing the above) was forwarded to the British Foreign Office by its representative at La Paz.

THE CURRENT QUARTERLY ISSUE OF THE BULLETIN OF THE IMPERIAL INSTITUTE.

Contains reports of recent investigations by the Scientific and Technical Department of the Institute of which two are of special interest to the general reader: (1) an article on the cotton industry of Nyasaland, showing its great extension in the Protectorate and describing the evolution of a type of cotton which has now been acclimatized and is recognised as a distinct commercial variety under the name of Nyasaland Upland; and (2) an article on Bermuda arrowroot, which, in the laboratory tests at the Imperial Institute, has been shown to evince distinctive properties from some "Bermuda" arrowroots on the London market that are reputed to come from Bermuda. A special article illustrated by a coloured plate, is contributed by Mr Gerald C Dudgeon, Director-General of the Department of Agriculture in Egypt, on the Cotton-worm in Egypt, in which the correlation of the yield in cotton with the degree of severity of cotton-worm attacks is examined in detail. The second part of an article on the Coal Resources of the British Crown Colonies and Protectorates is published; and there are other general notices respecting economic products and their development, among which is a comprehensive survey of the occurrence of bismuth ores—their distribution and utilisation throughout the world. The *Bulletin* concludes with some general notes, and with a summary of the contents of the more important papers and reports published during the preceding Quarter, on subjects within its purview, and notices of recent literature.

BRAZILIAN RUBBER.

AMOUNT OF GOVERNMENT GRANTS.

Rio De Janeiro, Jan. 12.—The special grants to be included in the estimates for the Ministry of Agriculture have now been fixed at 1,300 contos gold and 34,378 contos paper. They include provision for considerable improvements in a number of public services and for the promotion of settlement of sparsely-populated districts both by immigration and by local colonization, the promotion of agriculture, the establishment of agricultural training colleges, and the advancement of the rubber industry not only in the Amazon regions, but in all the States in which rubber-producing trees abound.

In accordance with a scheme elaborated by Dr. Pedro de Toledo, Minister of Agriculture, a great extension will be given to the latter industry by the perfecting of the methods of production and extraction as the result of which the exports of rubber, which already holds the second place in Brazil's list of exports, will be increased, while the price on foreign markets will be reduced by reductions in the cost of labour and the facilities provided in connection with the process of extraction.

At first the Senate proposed to cut out several of the items included in the estimates, but in the end gave way after hearing an eloquent explanation of the proposed measures given by Dr. de Toledo, who, moreover, had the support of an imposing majority in the Chamber—*Reuter.*

F.M.S. RUBBER EXPERIMENTS.

A LARGE FIELD.

The F.M.S. Department of Agriculture now controls a considerable area of land suitable for experiments in the culture of rubber. In addition to the experimental gardens in Kuala Lumpur, it has Castleton Estate, near Teluk Anson, with an area of rubber in bearing, planted, moreover, on flat land suitable for experiments. Also since January 1st, the Department has taken over, from the Forestry Department, Tanjong Pondok Estate in northern Perak, near Bagan Serai. On this estate there are over two hundred acres of para, twelve years old, so it should afford good opportunities for the investigation of all matters affecting rubber in bering. Besides the plantations already mentioned there is, of course, the estate at Kuala Tembeling in Pahang, besides the experimental gardens at Batu Tiga and Gunonga Angsi. It is unfortunate that the experimental gardens at Kuala Lumpur, adjoining the head offices of the department, should be less suited than some of the more distant estates for experimental purposes, owing to the hilly nature of the ground on which they are situated.—*Malay Mail*, Feb. 12.

RUBBER IN BRITISH GUIANA.

Planting of para rubber is steadily going on in British Guiana, according to a Colonial Office report just published, and over 1,800 acres are now under cultivation in the colony. Trees planted as recently as 1907-8 and 1908-9 are now being tapped, and the results are said to be satisfactory as regards yield and quality. It yet remains to be seen, however, whether cultivation on a commercial scale is practicable, as the outcome so far has not indicated any great measure of success.—*L. & C. Express*, Jan. 24.

A NEW RUBBER TREE: FROM MEXICO

A new rubber tree has been identified in Mexico from which a high-class rubber can be obtained. It is known by the natives under the name of Cacaloschili, says the "West Indian Committee Circular," which makes the announcement, and is one of the many species of the Plumeria. The particular variety of Plumeria rubia is found growing wild in the dry hill regions at a height of 1,000 to 5,000 ft. It thrives best in sandy or stony soils, among rocks, attains a height of 6 to 12 ft. and a girth of 8 to 24 ins. The tree grows quickly, and can be propagated by cuttings. The rubber obtained from the young branches is superior in quality to that from the stem of the tree, and for that reason tapping is not practised. The coagulated sap of the plant is stated to contain 21·9 per cent resinous matter, 15 per cent water, and 25·5 per cent caoutchouc.—*L. & C. Express*, Jan. 31.

(To the Editor, *Financial Times.*)

Sir,—I note a paragraph in your issue today referring to a "New Rubber Tree" which has been identified in Mexico.

I should like to put on record that a few years ago the late Dr. Olsson Seffer placed in my hands a memorandum on the same subject, and I extract from it the following information :—

> Some four years ago I collected specimens of a plant called by the Indians Cacaloxuchitl, and examination disclosed the fact that the latex of the plant contained a considerable percentage of rubber.

After a discussion on the rubber and resinous contents of the latex, Dr. Seffer went on to say that the botanical species was "principally Plumeria rubra, but probably also P. acutifolia and P. mexicana, which produce this rubber," and a further portion of the paper is devoted to the districts in which these trees are found and the nature of the soil, cultivation, etc. I think Dr. Seffer intended me to communicate the paper to a scientific journal, but apparently this was never done, and shortly afterwards he left for Mexico, where he met his death at the hands of the revolutionists. It is fair, however, to his memory that it should be placed on record that he was the first to study the Plumerias and Jatrophas of Mexico from a scientific point of view.—I am, &c.,

STUART R. COPE.

33, Great Tower-street, E.C., 29th Jan.

RUBBER-AND SANDLEWOOD AND LANTANA IN COORG.

The British Resident in Mysore is also Chief Commissioner of Coorg and visits that Province periodically. He is assisted by a Secretariat establishment, located in Bangalore, under the control of the first Assistant Resident, who is styled Secretary to the Chief Commissioner of Coorg. In Coorg itself, the Commissioner—in the year under review, Mr L T Harris, I.C.S.—with headquarters at Mercara is directly responsible with his assistants for the administration. His report of the administration for the year 1911-12 discloses, that coffee is looking up again and there is a probability of the worn-out plantations being replaced by a new growth. Rubber is being experimented with, both Ceara and Para, and there is said to be plenty of land available for plantations. The production of sandalwood is steadily decreasing, consequent on spike disease, and the invasion of that pestilent plant, the *lantana*, and Mr Tirement (Forests) thinks there is an intimate relationship between the spike ailment and lantana fires. On account of the *lantana*, lakhs of prospective revenue are being lost. Introduced into the province 46 years ago, it has become such a menace to the Eastern forests in Coorg that either the former must be allowed to kill out the latter or be itself rooted out and exterminated. The Inspector-General of Forests paid a special visit during the year and said the *lantana* must be got rid of. The Chief Commission thinks that a "few lakhs of rupees" spent in eradicating the pest "would prove a remunerative investment." If, instead of the *lantana*, those species of plants so necessary to the growth of the root parasite sandal were planted at the same time, the safety of this valuable tree would be assured.

GOLD COST COCOA CROP IN 1912.

Drop of 3¼ Million lb.

Information has been received from the Governor of the Gold Coast to the effect that the cocoa crop of the Colony for 1912 amounted to 86,197,151 lb, valued at £1,642,736, as compared with 89,482,226 lb in 1911, 50,609,950 lb. in 1910, and 45,277,606 lb. in 1909.—*Board of Trade Journal*, Jan. 30.

TEA FLUFF OR TEA REFUSE.

is now declared to be an excellent manure for roses. It is a fertiliser which results in immense blooms and which deepens the colour. —*Madras Times*, Feb. 4.

COCONUT DISEASES IN TOBAGO.

An interesting preliminary report on coconut cultivation in Tobago, by Mr. W G Freeman, Assistant Director of the Agriculture, Trinidad, has recently been published in the minutes of the meeting of the Board of Agriculture, Trinidad, for Septemer 20th, 1912. This deals principally with the unhealthy condition of coconut palms known as root diseases and calls attention to an important point of some interest that had been overlooked previously, viz., that the diseased condition of the roots themselves is confined to the horizontally spreading roots in the top 12 or 15 inches of the soil, and does not extend to the deeper roots. Another point to which attention is called is the existence of a possibly independent disease of which the symptoms are a rotting at the junctions of the leaf stalks with the stem and at the base of the very young fruits. The symptoms described by Mr Freeman are not confined to Trinidad and Tobago. Diseased trees whose appearance corresponds in every way with the account given by him have recently been examined in St. Vincent and possibly might be found in certain other of the smaller islands. Part of Mr. Freeman's account is as follows :—

'I am not at present in a position to draw any definite conclusions as to the cause of the trouble [i. e. root disease]. It is probable I think, that under varying conditions, various causes result in the symptoms which are characteristic of the disease. It can, however, be said that the trouble is not confined to areas of any particular soil. Coconut palms are affected on "rotten rock" both on hill sides and on the flat, on sands, coral deposits (coral sand), loams and heavy clays ; on virgin forest land, and abandoned cane lands ; on places at sea-level and at elevations up to 800 or 900 ft., on places which have been kept clean as well as on neglected areas.

'On most of the areas examined borings were made to a depth of 3 to 4 feet and much useful information obtained regarding the depth and character of the soil and subsoil, and of the level of the water-table. A collection of these soils and subsoils has been made. These will be retained as a reference collection and should be of value to intending planters in the future.

'In certain localities unfavourable conditions of soil and of water-supply are probably connected with the trouble, i.e., they either cause it directly or predispose the plant to attack.

'In other localities no such explanation appears to suit the facts yet the disease occurs.

'One estate (not in Tobago) offers an excellent instance of the trouble, fortunately slight in amount, occurring under apparently ideal conditions for coconuts. The soil is sand to the depth, to which dug down about 4 to 5 feet when water was reached. The area is drained and kept in good cultivation. Trees were dying with all the usual symptoms—premature dropping of leaves, falling of the immature nuts, formation of the red ring in the stem, and reddish brown discoloration and drying up of the upper horizontal layer of roots. Before digging it was thought possible that stagnation of water or other unfavourable soil condition might be a cause of trouble. It was ascertained, however, that the discoloration and decay of roots were confined to those running horizontally in the upper 12 to 15 inches of the soil. Those below, which run vertically down to and below the water-level, were perfectly sound. A similar state of affairs has since been seen elsewhere. If stagnation of water, or lack of aëration of the soil, had been the cause the lower roots would scarcely be healthy when the upper ones were unhealthy.

'Further work is necessary as to the cause of this root trouble, correlated as it is with the red ring in the stem, which red ring gradually progresses apparently from the base of the stem upwards.

'Then quite independent apparently of the root trouble and the red ring of the stem there is the fairly constant and characteristic decay at the base of the leaf where it joins the stem, and at the bases of the very young fruits.

'This trouble has previously been investigated by the Mycologist and others, but further work appears necessary to determine whether its occurrence in trees suffering from "root disease" is merely a coincidence or not.

'It is important to emphasize the fact that on several estates there is but little trouble at all. Others have affected trees over definite, often small areas. In other cases relatively large areas are affected. Unfavourable conditions are responsible, directly or indirectly, probably in some cases, but there are others, as already indicated, in which this explanation is not sufficient ; at any rate, it is impossible at present to point to any condition and say that it is unfavourable. Investigation in areas apparently well suited to the palm should yield useful results. These I propose to continue. The

restriction in some instances of the disease to the portion of the root system in the upper layer of soil of practically similar character throughout appears a point of some importance to which attention has not hitherto been directed.'

In concluding, Mr. Freeman says that this report is only of a preliminary nature and that the work will be continued with a view to ascertaining causes of diseases and to find a practicable and profitable remedy. This work should be of great value not only to Trinidad and Tobago but to the West Indian islands in general, and the results obtained will be awaited with interest.—Agricultural News.

ROBUSTA COFFEE.

CHARACTERS OF THE PLANT.—In certain vegetative characters, *C. robusta* would seem to occupy the same relative position with regard to *C. liberica*, as does that species to *C. arabica*. Robusta coffee grows more rapidly than Liberian, a plant eight months old being much taller and possessing more branches and leaves than Liberian coffee twelve months old. The plant is of a more robust habit, and the leaves though variable in size, are larger than those of *C. liberica*, but thinner and of a lighter green colour. The branches, however, have a tendency to bend downwards, so that the bush becomes somewhat umbrella shaped. Like *C. liberica* the plant flowers throughout the year, the flowers being intermediate in size between those of the species named and of *C. arabica*. Perhaps the most striking feature of Robusta coffee is the large number of berries borne in the numerous thick clusters, each of which contains on an average forty to sixty berries, though larger numbers are frequently met with. The berries are much smaller than in Liberian coffee, but, since the pulp is thinner, the beans are not markedly different in point of size from those of *C arabica*. Gallagher states that on an average 10 cwt. of Liberian berries give 1 cwt. of marketable coffee, while only 4 cwt. of Robusta berries are required to yield the same amount. In the case of the latter coffee, many more berries go to the hundred weight than is the case with Liberian coffee, but the greater number on the branches renders the picking 'if anything cheaper.' The red pulp is easily removed, as is also the thin parchment.

QUALITY OF THE COFFEE.—Considerable variation is to be found in the opinions expressed as to the quality of Robusta coffee, but it is not improbable that such differences are in some measures to be explained as a result of different methods of preparation, not all of equal excellence. It is stated that the beans do not possess a first-class colour, and that for the first two crops a good aroma is lacking; Dr. Wildeman affirms that the flavour recalls that of Liberian coffee, but with less aroma. Hart compared Robusta coffee with the coffee of Costa Rica and the East Indies; while, according to Cramer, the quality of well-prepared Robusta coffee is approximately that of middling Arabian coffee. The beans possess a bluish green colour, similar to that of the Arabian product, but they are of a somewhat different shape, being larger and more convex on the curved side.

In preparing Robusta coffee for consumption it is necessary that the beans should be well roasted and it is stated that the coffee loses less weight during this process than is the case with other kinds.—*Bulletin of the Imperial Institute.*

ANTISEPTICISING RAW RUBBER.

THE BYRNE PROCESS.

On Thursday, 30th ult., a representative of *The India Rubber Journal* attended at a demonstration of the Byrne Process of antisepticising raw rubber. The process consists of volatilising two fluids of which the composition is not stated, in a specially designed stove. The dense smoke thus produced is led in a chamber containing freshly crêped rubber. The rubber is left about three hours in this smoke, by which time the treatment is complete. We understand that the directors propose to issue licenses to work the process on a royalty basis. We shall probably have something further to say later on this subject, when we have fully investigated the new process and its product. Meanwhile it may be noted that the first consignment of rubber prepared on the Byrne method is on its way to London from the Straits.

THE WICKHAM PROCESS.

Colombo, Jan. 7.—The Wickham process of smoking and curing rubber is still on trial at the Botanic Gardens, and is proving very satisfactory. Recently his process was tried for curing the rubber from *Funtumia elastica*—the African rubber tree of Uganda fame. The latex of this tree is difficult to coagulate, but treatment in the Wickham B model smoking machine "did the trick," and coagulation took place in one hour-and-a-half, 3 lb. latex extracted from trees in the Peradeniya Botanic Gardens yielding 5½ oz. of cured rubber.—THE TAPPER.

SUMATRA RUBBER AT BATAVIA EXHIBITION.

EXCURSION TO SINGAPORE SUGGESTED.

A Deli planter, not in the rubber business, notes that the rubber association of the east coast of Sumatra have set aside f. 15,000 for participation in the rubber congress and exhibition to be held at Batavia in 1914. He writes to the "Deli Courant" of Jan. 29, suggesting that it might perhaps be a good thing to make use of the opportunity to advertise the rubber industry of the east coast in its own land. He thinks that as Singapore will be the point from which most of the international visitors of that congress will make the home journey, it might be possible for the said rubber association to organise an excursion to the east coast from Singapore, after the congress. He thinks it unnecessary to explain the usefulness of such an excursion at a time when countries and Governments are sufficiently convinced of it and reserve considerable sums for the purpose. The objection that this breaking of the home journey from Singapore might take up too much time, he meets with the argument that nearly all the visitors to the congress will have a journey of a couple of months at their disposal.—Straits Times, Feb. 17.

CULTIVATION OF YERBA MATE IN PARAGUAY.

H.M. Consul at Asuncion (Mr. F. A. Oliver) reports that though the cultivation of the Paraguayan tea plant, Yerba Maté, is a comparatively new industry, yet it seems to be one of considerable promise.

The Yerba maté (*ilex paraguensis*) grows profusely in the forests of sub-tropical South America, but its cultivation was considered impossible until a few years ago. The chief difficulty was in the germination of the seeds, but the founder of a German settlement in Paraguay claims to have solved the difficulty by removing the hard external tegument from the seed before planting. It is probable that much of the failure to germinate is due to the fact that the plant is bi-sexual, and that unless the female tree, which alone produces seed, is properly fertilised by a male tree in the vicinity, the seed is sterile. The proper method of rearing the seedlings was learnt by experience, and now the plant can be cultivated with success. The cultivation has, moreover, proved amply remunerative.

For the first four or five years there is little or no yield, but trees six or seven years old yield from four to seven pounds of yerba, while 12 or 13 years old trees yield about 16 lb. each. As the plant has until now only been cultivated to a limited extent, accurate data as to the average yield of the trees in the several stages of their development are not available. The principal plantation in Paraguay consists of only 300,000 trees, the oldest of which were only planted 12 or 15 years ago. In 1910 there were only 150,000 trees ready for picking, but the yield amounted to 572,000 lb. which proved the cultivation to be profitable. The yerba is gathered from each tree only once in two or three years. The young shoots are quite useless for making the "tea." At each harvest the trees are cut back as far as possible so that they may not grow too high.

H.M. Consul suggests that the cultivation of this plant might prove a useful and profitable industry in some of the sub-tropical British Possessions.—*Board of Trade Journal*, Dec. 26.

SYNTHETIC RUBBER.

Sir,—In your issue of the 25th there is a letter signed 'Rubber Shareholder,' in which it is remarked that 'Dr. Perkin's address does not, therefore, seem to have much value, except from the scientific chemical point of view, and may a arm your readers who hold rubber.' A careful persual of my paper will show that the rubber shareholder need have no fear as to the value of his shares, provided the company in which he is a holder is *bona fide* and well managed; if not, he had better clear out—synthetic rubber or not. Even if synthetic rubber were on the market there would be no need to sell shares, because as I explicitly stated in my paper there is room for both. I am afraid 'Rubber Shareholder' is very insular. Is it of no value from time to time to draw attention to the present state of the coal supply, the cotton production, and the production of rubber, synthetic and otherwise? In all industries it is of importance to 'take stock' every few years to ascertain whether progression or retrogression has taken place.

Another point in the letter: 'The scientific persons who write on this subject do not seem to grasp the fact that rubber is valuable not on account of its chemical formula, but for its physical qualities. When a person talks like this, reply is almost impossible. The chemist must first find the formula of a substance, and having found that try to build it up synthetically and then endeavour to produce in it all the qualities which made the natural product so valuable It is simply because he does grasp this fact that he starts at the foundation.

F. M. PERKIN.

—*The Field*, Feb. 1.

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THE PROGRESS OF CO-OPERATIVE CREDIT.

We recently directed attention to the inestimable benefits conferred upon the agriculturists of the Punjab by the extension of the co-operative credit system in that Province. There has just been issued from the Government Press a statement which shows how rapid has been the growth of this beneficent movement throughout India. In the five years from 1906-07 to 1911-12 the number of socities, central, urban, and rural, rose from 843 to 8,177, and the total membership from 90,844 to 403,318. The increase in the financial resources of the societies was even more marked. In the first of the years named the capital available, including loans from private persons and from other societies, share capital deposits by members, and State aid, aggregated Rs. 23¾ lakhs. By 1910-11 the total had gone up to Rs. 203½ lakhs, while at the end of the past financial year it had still further increased to Rs. 337¾ lakhs. The amounts named are, of course, small in comparison with the needs of India, but the progress achieved in so brief a period is very remarkable, and it indicates plainly the enormous potentialities of the future. A most gratifying feature of the position disclosed is the insignificance of the financial support which the societies derive from Government. It would be easy enough to lend funds to the cultivator on a wholesale scale, but the inevitable result would be to render the last state of the ryot worse than the first. The people must be taught at the outset the value of self-reliance and thrift, and to accept direct responsibility for the conduct of their village societies and for the repayment of the loans they make to each other. It was thought by many that the lessons of co-operation would be difficult to impart to the masses in India. But the experience of the past few years has shown this view to be wholly unfounded. The difficulty of the moment, indeed, is to secure that the system shall not be extended with a rapidity that is inconsistent with safety. "There is a distinct danger," said Sir Robert Carlyle at the recent Conference of Registrars at Simla, "now that the great benefits of co-operation are conspicuous, that we will be pressed to move too fast. I would not have ventured to say this four years ago, when the movement was in its infancy, and I trust you will not misunderstand me and think I want to throw cold water on the rapid exten-

sion of the co-operative movement. But I do wish to emphasise the fact that there is a danger in too rapid extension which may endanger the movement itself. Pressure is in many cases being brought to bear on you to register more and more societies whether the people are ripe for them or not, and weak societies will in the long run prevent the movement developing as it otherwise would do." So far, the progress has been made on sound lines, and that confidence is felt in the societies by the outside public is shown by the fact that the loans from private persons now amount to upwards of 88 lakhs of rupees. Meanwhile the deposits of members have reached a total of Rs. 65 lakhs, and the share capital is over Rs. 52 lakhs, while the funds advanced by the Government amount to but little more than Rs. 9 lakhs. The direct economic effect of the operations of the societies has been substantial. Mr Maclagan, who presided at the Simla Conference, pointed out that it was a fair assumption that the saving to the agricultural classes on the loans made was at least 10 per cent; so that, at a low computation, the cultivators are relieved of an unnecessary burden of Rs. 10 lakhs for every crore of rupees advanced. But the benefit does not stop there. It has been repeatedly shown by the Government officials entrusted with the supervision of the movement that the spread of co-operative credit has reduced litigation, stimulated the progress of sanitation, and created a desire among the people to be delivered from the incubus of illiteracy. These considerations make it all the more regrettable that Bengal is not keeping pace with other Provinces in the membership of its societies and the magnitude of their operations. The returns now issued show that at the end of 1911-12 the membership of the Madras societies was 66,156, and that their resources aggregated Rs. 75 lakhs. In the United Provinces there were 99,767 members, with Rs. 68 lakhs and in the Punjab 93,169 members with Rs. 70 lakhs. Bengal's figures were 38,569 members and Rs. 26 lakhs. It has been a constant complaint on the part of the Registrars that the progress of the movement in Bengal is retarded by the tacit refusal of the educated classes to assist the people in organizing societies, although in no part of India are professions of sympathy with the masses more frequent or more profuse. In the Punjab, on the other hand, as we pointed out the other day, adequate help is forthcoming from influential agriculturists, yet members of the societies are subjected, it seems, to an infamous system of persecution from countrymen of their own, occupying subordinate judicial positions. This occurs chiefly in the Munsiff's Courts. "The Munsiffs as a body," writes the Registrar, "are recruited largely from the money-lending or small shop-owner classes, so that many of them have a class prejudice against the Village Banks. This is shown in the way of vexatious and even illegal action towards parties who happen to be members of co-operative credit societies, and by insulting treatment of them in court. It is a not uncommon practice for a money-lender to put some member of a newly started bank into court with the object of frightening the other members, who are also on his books, from joining the society. Once the client is in court, many and various are the ways in which a hostile Munsiff can persecute him. There are very general complaints in some parts, and I propose to bring such cases to the notice of the Chief Court." It is to be hoped that the Registrar will take the matter up vigorously, and that any Munsiff proved to be guilty of the conduct described will be dismissed with ignominy from the position he has disgraced. The Government of India also will be well advised to keep a watchful eye on these proceedings.—"Indian Agriculturist," Jan. 1.

AGRICULTURAL EDUCATION IN ENGLAND THROUGH AUSTRALIAN EYES.

The following references are taken from a report by the Principal of Roseworthy Agricultural College, South Australia.

I paid a visit to the Cirencester Royal Agricultural College in June, 1910. At this institution I was received very kindly by the principal and staff and shown over all there was to see. I suppose on such an occasion it is only natural that a comparison with the institution with which I have been connected for close on 20 years should arise in my mind. I feel, however, that criticism on my part would not be justified. The conditions which Cirencester and Roseworthy are respectively meant to meet are so intrinsically different that any comparison between the two would, to my mind, be exceedingly unfair. I shall, therefore, content myself with stating that an institution conducted on the Cirencester lines could not possibly thrive in Australia. The Principal pointed out to me that the students were drawn exclusively from those ranks of society who do not need to do manual labor of any kind, and who, in the majority of cases, do not wish to take part in manual labour. It is evident in such circumstances that the training imparted must differ radically from the training imparted at Roseworthy; and the fact

that the institution is, as I was informed, very well patronised would appear to suggest that it meets the requirements for which it was brought into existence. Students' fees vary from £130 to £170 per annum, according to the style of residence allotted. These fees, according to the principal, were moderate when compared with average public school fees. One-half of the students, however, are non-resident.

Instruction imparted at Cirencester is almost entirely theoretical. There are only a few acres of land attached to the college, and the bulk of it is taken up with very nicely laid out grounds. Naturally there is but little room on this diminutive area for college-owned live stock. I counted, I believe, 12 head of cattle, 20 to 30 sheep, two or three horses, and a dozen pigs recently purchased in the market for fattening purposes. Farm buildings and workshops are of the most meagre description, although no doubt amply adequate to the calls that may be made upon them.

On the other hand, the college has a right of entry into a neighbouring farm for purposes of instruction; for this privilege they pay what may be termed a capitation grant regulated by the number of students in residence. Thus students do not take part in farm work, nor have the college authorities the advantage of working a farm on the lines that they might recommend to students. The practical training of students, therefore, is restricted to the observation of the success or failure that follows the efforts of a neighbouring farmer.

It should be noted that the institution labors under difficulties that are not of its making. It receives no grant-in-aid, and is burdened by a heavy ground rent; hence, any reduction in fees, even if it were desired, would spell ruin, and attempts at improvements involving the outlay of capital must prove exceedingly difficult.

On July 6th I transferred my headquarters to Cambridge, and I may say that I soon found myself in a most congenial atmosphere, an atmosphere that has, I believe, been created within recent years by a handful of enthusiastic workers. The Cambridge University has recently taken over a farm to be worked in connection with its agricultural courses, which I think must do much towards heightening their efficacy. The farm is as yet quite new and in the make, and there is little, therefore, that can be said on the subject in the way of criticism. I had occasion here to visit the plots of crossbred wheats that are being raised by Professor Biffen. He is laboring hard after a rust-resistant, strong flour wheat suited to British conditions.

From a perusal of recent Cambridge literature I had come to the conclusion that at Cambridge what is known as the Mendelian theory had become something like an obsession. When in the midst of the keen Cambridge scientific agriculturists I realised that I had not been mistaken. One is apt to find every natural phenomenon explained on the lines of this theory until we may look to it for a solution of the riddle of the universe. Far be it from me to deny to this theory all value; nevertheless, I think that it is being very much ridden to death.

On the Cambridge farm I made the acquaintance of two Merino rams that had come all the way from Australia, and very much fish out of water did they appear. They are being used for certain experiments in crossing on Mendelian lines; indeed, I had a look over some of the first crosses out of Shropshire ewes. They were not unlike, on the whole, some of our crossbred lambs out of Merino ewes by Shropshire rams. Results of scientific interest may perhaps arise out of these experiments; I doubt, however, their value in actual practice.—Agriculture in other lands for Feb.

RECENT PUBLICATIONS ON CACAO.

Two books on cacao have recently been reviewed in *Nature*; the first is entitled *Cocoa and Chocolate: Their Chemistry and Manufacture*; the second is entitled *Cocoa: Its Cultivation and preparation.* The former volume, by R Whymper, appears to deal mainly with the technique of manufacture, though a section is devoted to the botany and cultivation of the plant. In contradistinction to the comprehensive critical survey of the chemistry of cacao is the brevity of the section dealing with its cultivation. *Nature* points out the omission of certain important facts which may not be commonly known, even in the West Indies. For instance, much of the Gold Coast cacao is marketed in an unfermented condition; and the fact that some manufacturers in the United Kingdom prefer unwashed cacao, alleging that it is of better flavour than the washed article seems particularly noteworthy, as also does the suggestion that the practice of 'claying' easily degenerates into more 'weighting.'

The above volume is, of course, designed for the use of manufacturers and chemists; the second book, by Mr. W. H. Johnson, meets the requirements of the planter, rather than those of the manufacturer. Owing to Mr. Johnson's having acquired experience in the West Indies, the Gold Coast and Ceylon, his in-

formation is devoid of bias in favour of the practice of some particular area—a statement which cannot be said to apply to most text-books on cacao. Such matters as the selection of a site and the formation of a plantation are dealt with in such a way as to afford a useful guide in future planting. The preparation of cacao for the market, and especially such fundamental matters as fermentation, washing and 'claying' are very well discussed, and the work as a whole should prove particularly useful in places where cacao is the chief article of export.

This volume is the second in the series of Imperial Institute Handbooks, prepared with special reference to the requirements of British West Africa.

The first of these books is published at 15s net, by J. and A. Churchill, the price of the second is 5s net.—*Agricultural News*, June 4.

RICE IN INDIA.

Rice is the staple food of most of India, and about 35 per cent of the cultivated acreage in British India is under this product. Burma furnishes about three-fourths of the Indian shipments. The rice is principally exported from January until April. This product arrives on the western markets simultaneously with supplies from Saigon, Siam and other principal sources, and the market is therefore glutted and prices depressed. Java, being south of the Equator, harvests its rice about six months later than India, and the crop, being sold on bare markets, brings a much larger price. The question has been raised whether it might not be possible to adopt modern silos with a view to storing the Indian rice and marketing it at a later date.

The rice crops of 1910-11 and 1911-12 is the area that furnished forecasts were estimated at 27,896,900 and 26,099,600 tons for the two years, respectively, as compared with an average of 23,167,300 tons for the previous five years.

Ceylon is the largest purchaser of Indian rice, the shipments to that Colony for the year 1911-12 amounted to 380,978 tons. Other markets were: Japan, 140,922; China, 38,214 tons (not including large shipments by way of Straits Settlements); Java, 277,869 tons; Germany, 262,113 tons; United Kingdom, 136,778 tons; Netherlands, 151,372 tons; Austria-Hungary, 134,301 tons. Included in the above figures rice in the husk was exported to the amount of 55,263 tons, valued at $1,180,000, of which Ceylon took 33,901 tons and Straits Settlements 20,844 tons.—*Modern Sugar Planter.*

MANAGEMENT OF PLANTATIONS IN UGANDA.

UGANDA CHAMBER OF COMMERCE,
Kampala, 12th Feb. 1913.

SIR,

A letter under the above heading in a recent issue of your paper has been brought to the notice of this Chamber. The members consider that several of the statements made in it are, to some extent, a misrepresentation of the true state of affairs that exist here and are in consequence apt to be misleading.

With a view to warn young men, who, on the strength of the glowing prospects held out to them in the letter referred to, may be tempted to come out here on their own responsibility, I shall be glad if you will kindly insert this letter in your paper.

The future prospects of Uganda as a planting country are undoubtedly bright, but the industry is still in it's infancy and several years must elapse before it's success can be assured.

In any case, I would strongly recommend all young men, who may contemplate taking up planting in this country as a profession, to first secure an appointment with a proper agreement before coming out here; otherwise they may find themselves stranded—the passage out here involving a considerable outlay, and the cost of living is by no means cheap.—I am, Sir, Your Obedient Servant,

J. A. GRIGOR,
Secretary, Uganda Chamber of Commerce.

A NEW ALBIZZIA.

THE 95TH SPECIES.

Mr H H Latham, Deputy Conservator of Forests, sent specimens of an albizzia for identification to Dehra Dun from the Tinnevelly District. As the specimens did not agree with any recorded species in Dehra, they were sent on to Kew with no better result. No less than 94 species of the genus albizzia have been described, but with not one of them did Mr Latham's specimens agree. The plant is a new one and is called "Albizzia Lathamii."—*M. Times*, Feb. 25.

DYNAMITE EXPERIMENTS IN INDIA.

Experiments will shortly be made at Aligarh to test the value of dynamite in the reclamation of *usar* land. There is a large area of this kind of land in the Western Districts which is useless for cultivation owing to the excess of sodium carbonate it contains.—*M. Mail*, Feb. 17.

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HEVEA (PARA) INDIAN RUBBER.

A type of the trees, from which the original stock was obtained from the Tapajos-Madeira plateaux in 1875-6.